



**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 1  
Preliminary Information and Glossaries**

**Volume 2 of 2**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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# Volume 2 Part 1

## Preliminary Information

This Volume (Vol 2 Part 1) contains the Definitions/Glossary of Electrotechnology Terms.. In addition, the National Occupational Health and Safety Commission Glossary of Terms has been included. Users will find definitions here that clarify any Occupational Health and Safety specific terms. Where a term in the glossary is followed by a number, eg *Tools and equipment (2)*, the number indicates the AQF level.

Volume 2, Part 2 contains competency standard units and the Essential Knowledge and Associated Skills (EKAS). Each competency standard unit has a reference to the relevant Knowledge and Associated Skills, which are detailed separately from the competency standard units. This is designed to make the package easier to interpret and apply. In the Essential Knowledge and Associated Skills section of each unit there is reference to the relevant EKAS, identified by a unique clause number and title. This separate Essential Knowledge and Associated Skills forms an integral part of each competency standard unit, and all assessment evidence activities and reporting processes are to incorporate this specification.

## Training Package Layout

This revised Electrotechnology Industry Training Package has been developed, reviewed and validated through extensive industry consultation. It reflects the views of a wide cross-section of the industry and its key stakeholders/practitioners throughout Australia.

The Training Package has been constructed as a two volume set. Volume 1 covers the overall Package framework and completion requirements for qualifications. Volume 2 includes the content details of parts and sub-sections of Volume 1. The two volumes form an integrated whole and are not to be used independently of each other.

## Volume 1

Preliminary Information

Current Membership of the National Steering Group  
The Electrotechnology Industry

Part 1 Qualifications Framework

Part 2 Competency Standards Overview and Index

Part 3 Assessment Guidelines

Appendix A — New Apprenticeships

Appendix B — Sample Assessment Instruments

Enclosures

- Enclosure A: List of Sample Assessment Instruments
- Enclosure B: Administrative Forms
- Enclosure C: Glossary of Terms

## Volume 2

Preliminary Information

Part 1 Definitions/Glossary

Part 2 Competency Standards

2.1 Competency Standard Units

A – Assembly

B – Broadcast

C – Commercial

D – Computer systems

E – Cross discipline

F – Data and voice communications

G – Electrical

H – Electronic

I – Instrument and control

J – Refrigeration and air conditioning

K – Renewable and sustainable energy

L – Imported

M – Hazardous areas

N – Rail systems

P – Restricted and specialist

R – Research

## 2.2 Essential Knowledge and Associated Skills (EKAS)

Part 3 Literacy and Numeracy Skills

Part 4 Key Competencies

Part 5 Skills Enabling Employment

### **Volume 1: Structure and Overview**

#### **Part 1 – Qualification Framework**

Information in Part 1 outlines how the qualifications are structured, along with their scope/descriptions, composition and content. Completion and issuance requirements are provided as well as advice on flexibility arrangements, with entry and exit pathways and articulation arrangements. Titles and codes of the list of qualifications to be issued are also included.

#### **Part 2 – Competency standards**

Information in Part 2 outlines how the competency standards were developed (in broad terms). The industry coverage they apply to, as well as the format and construction of the individual competency standard units is provided. The index of Competency Standard Units and their scope/description is included in this part. Matters related to language, literacy and numeracy, access, equity and cultural diversity, and any regulatory arrangements, for which the competency standard units may apply is also included. Importantly, each competency standard unit is interrelated and linked with the Definitions/Glossary and Essential Knowledge and Associated Skills sections of the Volume. Each competency standard unit must not be used in isolation or exported without these interrelated components.

There are nearly 500 competency standard units included in Volume 2, each listed according to their respective industry discipline area.

#### **Part 3 – Assessment guidelines**

Information in Part 3 outlines how the assessment guidelines inform RTOs about the infrastructure requirements they will need, to enable them to carry out training delivery assessment activities related to the Training Package. This includes assessment systems, the role of the RTO, assessment pathways, recognition arrangements, assessor qualifications and sources of information.

Included in the Part 3 are Appendix A: New Apprenticeships Application and Appendix B: Sample Assessment Instruments. Appendix B also contains Enclosures A, B and C: A – a List of Sample Assessment Instruments, B – Administrative Forms and C – Glossary of Terms.

### **Volume 2: Competency Standard Units – Content and Scope**

Volume 2 Part 1 contains the Competency Standards Units in their respective disciplines: Assembly; Broadcast; Commercial; Computer systems; Cross discipline; Data and voice communications; Electrical; Electronic; Instrument and Control; Refrigeration and air conditioning; Renewable and sustainable energy; Imported; Hazardous areas; Rail systems; Restricted and specialist; Research

Volume 2 Part 2.2 contains the Essential Knowledge and Associated Skills and an Essential Knowledge Matrix mapping the essential knowledge and associated skills to each Unit.

Volume 2 Parts 3-5 contain information and definitions relating to literacy and numeracy skills, Key Competencies and skills enabling employment. Users should refer to these sections when developing learning and assessment resources..

### **Important Note to Users**

Training Packages are dynamic documents. They are amended periodically to reflect the latest industry practices and are version controlled. It is essential that the latest version is always used.

#### ***Check the version number before commencing training or assessment***

This Training Package is Version 1 – check whether this is the latest version by going to the National Training Information Service ([www.ntis.gov.au](http://www.ntis.gov.au)) and locating information about the Training Package. Alternatively, contact the Training Package – developer and technical content custodian ElectroComms and EnergyUtilities Industry Skills Council Ltd trading as EE-Oz Training Standards <http://www.eeoz.com.au/> to obtain relevant content advice and confirm the latest version number.

#### **Explanation of version number conventions**

The primary release Training Package is Version 1. When changes are made to a Training Package, sometimes the version number is changed and sometimes it is not, depending on the extent of the change. When a Training Package is reviewed, it is considered to be a new Training Package for the purposes of version control, and is Version 1. Do not confuse the version number with the Training Package’s national code (which remains the same during its period of endorsement).

#### ***Note the change of National Code from UTE99 to UEE06 for this Training Package.***

In Volume 2, Part 2 the competency standard units and the Essential Knowledge and Associated Skills are found. The competency standard units refer to the Knowledge and Associated Skills in the respective section of each competency standard unit. As with the Definitions/Glossary, users should apply the requirements found in the Essential Knowledge and Associated Skills section of the Training Package for an outline of what is defined. The competency standard units themselves only refer to the clause number and reference title of the Essential Knowledge and Associated Skill, and further specific information that is to be covered is elaborated in Volume 2, Part 2.2.1. The separation of the essential knowledge and associated skills from the competency standard units has occurred to facilitate user friendliness for interpretation, applicability and future maintenance. Each competency standard unit has listed within its essential knowledge and associated skills section a unique essential knowledge and associated skills clause number and title. Further elaboration of the specification that applies to the essential knowledge and associated skills clauses is included in the separate essential knowledge and associated skills section of this Volume (2) of this Training Package. This separate essential knowledge and associated skills forms an integral part of each competency standard unit, and all assessment evidence activities and reporting processes are to incorporate this specification.

## Definitions

### Scope

The Definitions/Glossary provided here should not be considered a definitive and exhaustive list. The terms provide added meaning to a term and the range in which it may be used and generally understood by Industry, including regulators and practitioners.

### Application

The information contained in each competency standard unit includes the intended use of the unit for assessment and a training program(s).

### References

#### Regulations

The work functions described by competency standard units in this Training Package may be subject to statutory regulations. Where this is the case the particular regulations will depend on local jurisdictions and knowledge and application of such regulations within the scope of the unit shall be an aspect of evidence in deeming a person competent. Refer to in 1.4 Definitions

#### Reference documents

Each part of the Training Package will include a list of reference documents. These are a component of competency which assist in developing training programs and assessing competency, which include relevant legislation, regulation, industrial instruments, codes of practice, guidelines and advisory standards and policies. Examples may include industry preferred training and assessment models, anti-discrimination and equal employment opportunity statutes encompassing application of access, equity and cultural diversity principles associated with under-represented groups. They should be used wherever required and currency is to be assured in their application.

## Electrotechnology Definitions

The definition of terms used in this Part 2 of the Training Package form an integral part of the Training Package.

### 1.4.1 Access permits

A form type document giving formal permission to enter a specified work area when it is safe to do so and is part of the risk control measures for the area.

### 1.4.2 Accessories

Devices forming part of an electrotechnology system or installation but not including those defined as apparatus

### 1.4.3 Apparatus

Any device used to convert energy from one form to another and any device used for control or protection of a persons, environment or a system.

**1.4.4 Appliance**

An energy using device, other than a lamp, in which electricity and/or gas is converted to any other form of energy.

**1.4.5 Appropriate person**

Individuals with responsibilities for design, installation, maintenance, production or servicing activities or a customer or a person of higher authority.

Note:

Examples of an appropriate person is a site manager, a project manager, a line managers, a supervisors a team leader and a customer's representative.

**1.4.6 Approved**

Acceptable to an authority having jurisdiction.

**1.4.7 Assessment of competence**

The process of checking and confirming the ability to carry out specific work activities and/or functions based on evidence that shows a person can carry out such work safely and to requirements.

**1.4.8 Australian Qualifications Framework (AQF)**

Australian Qualifications Framework Qualifications described in terms of levels characterised by the outcomes of vocational education and training. The Australian Qualifications Framework is intended to provide a comprehensive, nationally consistent, flexible framework for all qualifications in post-compulsory education and training.

**1.4.9 Australian Quality Training Framework (AQTF)**

A set of nationally agreed Standards to ensure the quality of vocational education and training services throughout Australia. The AQTF includes two sets of Standards:

1. Standards for Registered Training Organisation
2. Standards for State and Territory Registering/Course Accrediting Bodies

**1.4.10 Authorised**

Permission granted by a relevant higher authority to use particular equipment or to carry out specified work.

**1.4.11 Authority**

Agency representing the interest of another party and with the responsibility to make decisions on their behalf.

Note.

Examples are a customers representative and agencies responsible for implementation of legislation

**1.4.12 Cardiopulmonary Resuscitation (CPR)**

An emergency life-support procedure using a combination of expired air resuscitation and external cardiac compression.

#### 1.4.13 Checks, functional

The process of verifying that items of equipment operate as intended. Functional checking is used confined to basic systems.

#### 1.4.14 Checks, visual

The process of identifying defects that are apparent to the eye. Visual checking is used confined to basic systems.

#### 1.4.15 Competency

Competency comprises the specification of knowledge and skills and the application of that knowledge and skill to the Standards of performance required in the workplace.

Competency includes all aspects of work performance and not only narrow skills. The four components of competency are: task skills; task management skills; contingency management skills and job/role environment skills.

#### 1.4.16 Competency Standard Unit(s) *See also units of competency*

A competency standard unit is the group of skills and knowledge required by an individual to carry out a useful work function.

A single Competency Standard Unit is not to be confused with a job description that will invariably comprise of a number of competency standard units.

Competency standards are made up of a number of Competency Standard Units. These units describe a key function or role in a particular job function or occupation. Each unit identifies a discrete workplace requirement and includes the knowledge and skills that underpin competency, as well as language, literacy and numeracy and Occupational Health and Safety requirements. A competency standard unit is usually linked to one or more AQF qualifications.

The fields in each competency standard unit and the types of information they contain are given in the Table below.

Field Title	Type of information
Unit code	Unit title
Unit Descriptor	<p><b>1) Scope</b></p> <p>General description of the scope of the work function to which the competency applies and the general abilities needed.</p>
Prerequisite Units	<p><b>2) Prerequisites</b></p>
Competencies	<p><b>2.1) Competency Standard units</b></p> <p>Specific and general competencies expected to have been achieved prior to undertaking training in the unit.</p>
Literacy and numeracy skills	<p><b>2.2) Literacy and numeracy skills</b></p> <p>Informs the reading, writing and maths skill level needed to achieve competence in the unit.</p>

Field Title	Type of information
<p><b>Application of the unit</b></p>	<p><b>3) Application</b> The way in which the Unit is intended to be used in a learning program or qualification</p>
<p><b>License to practise</b></p>	<p><b>3.1) Licensing</b> Indicates how technical standards, codes of practice and regulatory requirements apply to the Unit and whether a licence to practise is required.</p>
<p><b>Competency field</b></p>	<p><b>4) Discipline</b> The sector of the Electrotechnology industry to which the unit mainly applies.</p>
<p><b>Elements and Performance Criteria</b></p>	<p><b>5) Elements</b> Outcomes that contribute to a unit.</p> <p><b>5) Performance Criteria</b> Specify the required levels of performance for each Element.</p>
<p><b>Required skills and knowledge</b></p>	<p><b>6) Essential knowledge and associated skills</b> Knowledge that is either explicit or implicit to effective performance.</p>
<p><b>Range Statement</b></p>	<p><b>7) Range</b> Range of context and conditions to which performance criteria apply.</p>
<p><b>Evidence Guide</b></p> <p><b>Overview of assessment</b></p> <p><b>Critical aspects of evidence required to demonstrate competency in this unit</b></p> <p><b>Context and specific resources for assessment</b></p> <p><b>Methods of assessment</b></p>	<p><b>8) Evidence guide</b> Assists with the interpretation and assessment of the unit</p> <p><b>8.1) Overview</b> Provides a summary of appropriate assessment methods and what they encompass.</p> <p><b>8.2) Critical Aspects of Evidence</b> Particular knowledge and skills essential to effective performance.</p> <p><b>8.3) Context</b> Environment and resources acceptable for assessing achievement of competency. Informs of the resources needed when simulating real the work place is considered and indicates when simulation of the workplace may be a viable or necessary.</p> <p><b>8.4) Assessment Methods</b> Indicates the acceptable methods of assessment which are specified in Section 3 of this document.</p>

Field Title	Type of information
<b>Concurrent assessment and relationship with other units</b>	<b>8.5) Concurrency</b> Identifies where benefits may be derived by assessing two or more units concurrently or sequentially.
<b>Key Competencies</b>	<b>8.6) Key Competencies</b> Generic competencies enabling effective participation in work and their incorporation in the competency standard units (see Volume 2 Part 4).
<b>Skills enabling employment</b>	<b>8.7) Skills enabling employment</b> Generic competencies related to enabling skills for workplace employment activities (see Volume 2 Part 5).

#### 1.4.17 Competency Standards

Competency Standards are the collection of competency standard units for a particular industry sector and are an integral part of a Training Package.

The competency standard units described in this document are part of the draft Electrotechnology Industry Training Package UEE06.

#### 1.4.18 Complex

Made up of many interrelated parts the behaviour or performance of which effect the behaviour or performance of the whole.

Note.

Example in the context of electrotechnology are systems with many interworking subsystems, complex work activities such as some testing procedures and aspects of some essential knowledge.

#### 1.4.19 Compliance

An installation or equipment that conforms to relevant regulations which may include technical standards, codes or practice and the like.

#### 1.4.20 Computer system

Computer hardware, software and connectivity components that make up a system to operate, control or analysis a process.

#### 1.4.21 Defects

Physical or performance aspects of an installation or equipment that do not comply with the relevant regulations, standards or job specifications.

#### 1.4.22 Documentation

Written information, either hard or soft copy, related to a work function.

Note.

Examples of documentation are forms, work instructions, specifications, drawings, reports

#### **1.4.23 Electrical installation, general**

All parts of an electrical installation in a building, structure and premises that are not designated as special electrical installations or those related to hazardous areas.

#### **1.4.24 Electrical installation, special**

Electrical installation related to moveable premises and caravan parks, shows and carnivals, boating marinas, medical treatment areas. cranes and hoists, lifts, electric fences and construction and demolition sites.

#### **1.4.25 Electronic sub assemblies**

An assembly of connected electronic components designed for a particular function that forms part of electronic apparatus or system.

#### **1.4.26 Enterprise standards**

Standards of management, performance, service or product established by an enterprise.

#### **1.4.27 Endorsement**

The variations in equipment or function in which an individual demonstrates competence relevant to a competency standard unit. An endorsement applies to competency standard unit in the disciplines of 'Hazardous areas' and 'Restricted and special electrical work' and is shown by a suffix to the unit title. Details of endorsements are given in the competency standard units where they apply

#### **1.4.28 Equipment**

Any component part or apparatus accessory of an electrotechnology system or installation

#### **1.4.29 Established procedures**

Formal arrangements of an organization, enterprise or statutory authority of how work is to be done and by whom.

Note.

Examples of established procedures are documented in quality management systems, safety management systems, work clearance systems, work instructions, reporting systems and arrangements for dealing with emergencies.

#### **1.4.30 Essential knowledge and associated skills (EKAS) learning specification (LS)**

Provide specific advice in facilitating consistency and reliability in resource development and delivery. The learning specifications are premised on the separate content of the essential knowledge and associated skills section of the expanded Volume 2 – Essential Knowledge and Associated Skills clauses, which are referred to in each competency standard unit.

The specifications are designed to:

- provide the depth and breadth of essential knowledge and associated skills to be learned
- ensure they support the needs of the workplace

- contain assessment strategies, including a table of specifications, to increase validity, reliability and fairness
- detail the resources required for satisfactory delivery in the learning environment
- provide clarification regarding the type and quantity of evidence needed for assessment purposes
- support a variety of delivery modes, eg face-to-face, distance or computer-assisted learning
- provide content and structure that maximises learning retention
- provide a clear purpose statement about their relationship to the overall educational program.

#### **1.4.31 Established routines**

Strict procedures for carrying out a work activity or task often formalised in the form of work instructions.

#### **1.4.32 Explosion protection**

Techniques applied to the design of electrical equipment, components and systems to prevent the electrical energy from becoming an ignition source in the presence of flammable vapours and gases or combustible dusts in hazardous areas.

#### **1.4.33 Fall prevention**

Safe working practices intended to prevent persons or objects from falling from a height regarded as hazardous.

#### **1.4.34 Hazard**

Something with the potential to cause injury or disease to persons, damage property or disrupt productivity.

#### **1.4.35 Hazardous area**

Area in which an explosive atmosphere is present or may be expected to be present in quantities such as to require special precautions for the construction, installation and use of electrical equipment. Hazardous areas may include a variety of adverse environmental conditions such as those encountered in coal mines, shipping, oil/gas platforms and the like, which commonly require further specifications stated in legislation or regulatory requirements.

#### **1.4.36 Hazardous area records**

Records that show a hazardous area has been appropriately classified and the electrical equipment comply with the appropriate certification and other relevant requirements specific to the site. Generally referred to as a 'Verification Dossier'

#### **1.4.37 Industry standards**

Standards of management, performance, service or product established by a representative Industry Body. This Training Package is an example of an industry standard.

#### **1.4.38 Inspection, actions taken**

Actions taken by an inspector in relation to defects in an installation.

Note:

Examples of such actions are disconnection or non-connection of supply until a defect is rectified, notice of period in which it has to be rectified, other actions within the scope of inspection authority.

#### **1.4.39 Inspection, audit**

An inspection that reviews the regulatory obligations of enterprise. Audit inspections may involve reviewing records of work, inspection of safety equipment and inspection of recently completed work.

#### **1.4.40 Inspection, close**

An inspection which encompasses those aspects covered by a visual inspection and, in addition, identifies those defects, eg loose fasteners, which will become apparent when access equipment, eg steps, and tools are used. Close inspections do not normally require an enclosure to be opened or equipment de-energised.

#### **1.4.41 Inspection, detailed**

An inspection that encompasses those aspects covered by a close inspection and, in addition, identifies those defects that only become apparent when an enclosure is opened up, or by use of tools and test equipment.

#### **1.4.42 Inspection, visual**

An inspection that identifies, without the use of access equipment or tools, those defects that are apparent to the eye.

#### **1.4.43 Install**

1. The act of placing and permanently fixing equipment in place in a building or premises.
2. Placing and setting up an operating system and application software on a computer or network.

#### **1.4.44 Installation**

Installation includes all equipment and component parts or a system as they are fixed in place and connected as necessary, to operate as intended.

Note.

Examples of installations are antenna installations, electrical installation, home entertainment installations and refrigeration installation.

#### **1.4.45 Key competencies**

Generic competencies enabling effective participation in work and their incorporation in the Units of Competency (see Appendix A).

#### **1.4.46 Learning Specification (LS)**

See Essential Knowledge and Associated Skills (EKAS).

#### **1.4.47 Maintain**

Ensuring systems, equipment or apparatus continue to work properly by checking, repairing faults, rectifying malfunction and making adjustments as required.

#### **1.4.48 Maintenance, scheduled**

A formal process of periodically checking, overhauling and replacing equipment and/or components based on the assessment of risk associated with their failure during operation.

#### **1.4.49 Non-compliance**

Aspects of an installation or equipment that do not satisfy the applicable regulations, standards or requirements.

#### **1.4.50 OHS policies and procedures**

Arrangements of an organization or enterprise to meet its legal and ethical obligations of ensuring the workplace is safe and without risk to health. ( See also Glossary of OHS terms)

Note:

Ensuring a workplace is safe will include hazards identification and risk assessment mechanisms, implementation of safety regulations, safety training, safety systems incorporating work clearance procedures, isolation procedures, use of protective equipment and clothing and use of codes of practice.

#### **1.4.51 Permit, clearance to work**

A system that authorises, in writing, specified work activities to be carried out in specified work location at a specified time as part of the risk control measures. The system includes safety procedures that shall be followed before authorisation is given.

Note.

Example. Work permit systems operate in the electricity supply sector, in petrochemical plants, in refineries, in heavy manufacturing and in rail networks

#### **1.4.52 Process control**

Control of actions used in the manufacture, analysis and modification of materials.

#### **1.4.53 Process control system**

System used to control processes

#### **1.4.54 Regulated environment**

Are those requirements that are to be met for regulated purposes including but not limited to licensing regimes; registration regimes; industrial instruments and/or arrangements; standards; codes of practice; industry wide preferred approaches encompassing industry polices and guidelines advised for respective Training Package non-endorsed implementation.

#### **1.4.55 Reporting**

Formally written or computer entered and stored document detailing the outcomes of a work activity. (See 1.4.15 Documentation)

**1.4.56 Requirements**

That to which equipment and procedures and their outcomes shall conform and includes statutory obligations and regulations and Standards called-up by legislation or regulations.

Requirements may include codes of practice, job specifications, Standards called up in specifications, procedures and work instructions and quality management systems.

**1.4.57 Risk assessment**

Process of evaluating the likelihood and consequences of occurrences that would have an adverse affect on safety, health and the environment of a work area and the operation and viability of an enterprise.

**1.4.58 Risk control measures**

Methods and equipment for preventing risk of injury or damage from a hazard. Many risk control measures have been established and formalised in standards and codes of practice.

**1.4.59 Safe design principles**

Principle applied in the design of a product that take into account means to reduce harmful effects to both persons and the environment during its manufacture, its use and its disposal at the end of the life of the product.

**1.4.60 Safe working**

System of procedures used to ensure safety in work and operation related to rail systems.

**1.4.61 Servicing**

Maintaining, fault finding and repair of equipment, plant machinery and installations.

**1.4.62 Set-up**

Place in operation equipment that requires certain procedures to be followed before it can be used. Typical items of equipment that require setting up are appliance, computers and home entertainment equipment.

**1.4.63 Skill enabling employment**

A range of genetic employment based skills that are expected of individuals in a workplace. (See Volume 2 Part 5)

**1.4.64 Specifications**

All those attributes that define accurately the nature of the involved hazards, materials/products, processes, equipment and installation design.

Note:

Examples of specifications are design and manufacturer specifications defining all the necessary parameters and tolerances, process flow diagrams, explosive characteristics and technical data sheets for hazardous materials and products.

#### **1.4.65 Standard, deemed to comply**

A guide setting out methods and materials that if applied in the prescribed way will satisfy the requirements of a performance-based technical standard.

#### **1.4.66 Standards, technical**

Technical documents which set out specifications and other criteria for equipment, materials and methods, to ensure they consistently perform as intended. The Standards referred to in this Standard are those published by Standards Australia or an industry association.

#### **1.4.67 Sustainable energy, practices**

Working in a way that eliminates unnecessary energy use and material waste and disposes of the necessary waste with minimal effect on the environment and in compliance with regulation.

#### **1.4.68 Training Package**

A Training Package is a set of nationally endorsed Standards and qualification for recognising and assessing peoples skills. A training package specifies the outcome of training and is not a prescription of how an individual should be trained.

#### **1.4.69 Unit of competency**

See competency standard unit.

#### **1.4.70 Voltage, extra-low**

Not exceeding 50 V a.c. or 120 V d.c.

#### **1.4.71 Voltage, high**

Exceeding low voltage

#### **1.4.72 Voltage, low**

Exceeding extra-low voltage, but not exceeding 1000 V a.c. or 1500 V d.c.

#### **1.4.73 Work instructions**

Strict and formal instruction on how a work activity or task is to be carried out.

#### **1.4.74 Work platform**

Equipment specifically designed to access a work area out of normal reach above the ground or floor level.

Note.

Examples are step ladders, extension ladders, scaffolding, pole platforms, 'cherry pickers' and the like.

#### **1.4.75 Workplace procedures**

See 1.4.29 Established procedures

#### **1.4.76 Work site protection**

Processes and procedure to manage or prevent the passage of trains over a section of (rail) track for which possession has be acquired so that maintenance or repair work to be carried out.

## **Additional Glossary of terms for Occupational Health and Safety**

### **Introduction**

This Glossary of Occupational Health and Safety (OHS) Terms has been developed to assist competency developers and writers, reviewers of training packages and those developing any training specification or learning materials for the Vocational Education and Training environment.

In Australia we consider that the rate of workplace fatality, injury and ill-health is far too high. To reduce this toll we need to make some changes in the work place and this requires training to enable business and workers to effectively manage safety.

We must get OHS right in the competency so that the resultant learning contributes to improving the capacity of those in the workplace to manage safety. This applies not only to the ‘designated’ OHS units but to the integration of OHS, as appropriate, into all competencies, learning programs and learning resources.

The competency, TAADES505A *Research and develop competency standards*, specifies the outcomes and the knowledge and skills required to research and develop documents which outline competency requirements for a particular job function, work process, work role or specific vocational outcome. This competency cites four phases in developing a competency:

1. Research the competency area
2. Formulate competency specifications
3. Validate competency specifications
4. Finalise competency specifications.

OHS is a critical aspect of research into the competency area, and also an important aspect of work performance to be integrated within a competency.

As in many technical areas, OHS has, to some extent, its own language. OHS is ‘owned’ by many people as it impacts on all of us, however key words and terms are not always used in a consistent manner and this can lead to confusion. To maximise the effectiveness of our training and education we need to ensure that our use of the OHS language is as consistent and clear as possible.

This glossary is not intended as a definitive dictionary of OHS terms but is designed to be used in the second phase of competency development, formulate the competency specifications. It is also an invaluable tool for those involved in the design and development of learning resources.

Further information on OHS hazards, practical guidance material, standards and codes of practice is available at the National Occupational Health and Safety Commission website at [www.nohsc.gov.au](http://www.nohsc.gov.au)

The glossary is intended to be an evolving and dynamic document and those wishing to comment on the terms or suggest additions or modifications should email the Team Leader of the OHS Skills Development Team at NOHSC.

## GLOSSARY OF OHS TERMS

NOHSC Glossary	Explanation
<b>Accident</b>	A term that is now considered out of date. Preferred term is 'incident'.
<b>Accountability</b>	The process by which a person with OHS responsibilities is answerable to a higher authority.
<b>Action level</b>	The level at which a risk is considered to be unacceptable and action is required to reduce the level of risk. May be specific such as a noise level at which hearing protection must be worn, a concentration of chemical or more generic.
<b>(OHS) Action plans</b>	Documented plans developed within the workplace to implement OHS management, which include allocated responsibilities and time frames.
<b>Administrative controls</b>	Management practices that aim to control employees' exposure to specific hazards, and generally improve health and safety – examples include the use of job rotation, job enlargement
<b>ALARA (As Low As Reasonably Achievable)</b>	A basic concept where risks are kept as low as is reasonably achievable. ALARA is determined by reference to established codes and standards and consultation with groups impacted by the decision outcomes including those exposed to the risk.
<b>Anthropometry</b>	The science dealing with the comparative measurement of the size and proportions of the human body, the range of movement of limbs, as used in ergonomics.
<b>(OHS) Audit</b>	A systematic examination against an agreed benchmark of the approach to managing safety to evaluate an organisation's arrangements for identifying hazards, assessing and controlling risks, and monitoring and improving the effectiveness of the management of OHS and compliance. <i>(Note: a workplace inspection is NOT an audit.)</i>
<b>Audit tools</b>	The instruments for collecting evidence and conducting the analysis and evaluation (they are not the same as the audit criteria or benchmark), they may be: <ul style="list-style-type: none"> <li>• developed specifically for the purpose</li> <li>• adapted from existing tools</li> <li>• purchased or accessed from existing tools</li> </ul> and include: <ul style="list-style-type: none"> <li>• performance checklists</li> <li>• sets of questions to be asked</li> <li>• descriptions of required characteristics to be checked</li> <li>• limitations for and instructions for use</li> </ul>
<b>Authorisation of permit</b>	Signing of permit by competent person.
<b>Biomechanics</b>	The application of mechanics (forces and motion) to analyse body movement and the stresses involved in body posture during movement.

NOHSC Glossary	Explanation
<b>Causative event</b>	Key event that resulted in the particular outcome(s) of injury or damage.
<b>Circumstance</b>	Short-term situation that is relatively unusual, such as a storm or when a key person is absent.
<b>Certification</b>	Refer 'operator certification.
<b>Common law</b>	Law that is derived from the English legal system and has evolved through judicial decision and practice (case law) that establishes and follows precedent. Note difference to 'statute law'.
<b>Condition</b>	Permanent situation such as type of equipment, work practice, design of work environment (often different to detect or identify) that may contribute to risk.
<b>Consequence</b>	The injury or damage outcome of an event, which may be expressed quantitatively or qualitatively; there may be a range of possible outcomes for a specific event or scenario.
<b>Confined space</b>	<p>An enclosed or partially enclosed space which-</p> <ul style="list-style-type: none"> <li>• is at atmospheric pressure during occupancy</li> <li>• is not intended or designed primarily as a place of work, and is liable at any time to - <ul style="list-style-type: none"> <li>- have an atmosphere which contains potentially harmful levels of contaminant</li> <li>- not have a safe oxygen level or</li> <li>- cause engulfment, and</li> </ul> </li> <li>• may have restricted means for entry and exit.</li> </ul> <p>A confined space is determined in part by the hazards associated with a defined set of circumstances (restricted entry or hazardous atmosphere, risk of engulfment) and not just with work performed in a restricted space. Examples include but may not be limited to:</p> <ul style="list-style-type: none"> <li>• storage tanks, tank cars, process vessels, boilers, pressure vessels, silos and other tank-like compartments</li> <li>• open-topped spaces such as pits or degreasers</li> <li>• pipes, sewers, shafts, ducts and similar structures</li> <li>• shipboard spaces entered through a small hatchway or access point, cargo tanks, cellular double bottom tanks, duct keels, ballast and oil tanks and void spaces (but not including dry cargo holds).</li> </ul> <p>A person is deemed to have entered a confined space when their head (ie. the breathing zone) or upper part of the body is within the boundary of the confined space. (Note that inserting an arm for atmospheric testing is not considered an entry to a confined space).</p> <p>References:</p> <ul style="list-style-type: none"> <li>• AS/NZS 2865:2001 Safe working in a confined space</li> <li>• Handbook - HB 213:2003 Guidelines for safe working in a confined space</li> </ul>

<p><b>Consultative arrangements</b></p>	<p>State and Territory OHS legislation specifies obligations for workplace consultation. The workplace arrangements to meet these obligations may include:</p> <ul style="list-style-type: none"> <li>• OHS and other consultative and planning committees</li> <li>• health and safety and other employee representatives</li> <li>• employee and supervisor involvement in OHS activities such as inspections and audits</li> <li>• procedures for reporting hazards, and raising and addressing OHS issues</li> <li>• employee and workgroup meetings.</li> </ul> <p>Factors that should be considered when developing consultative arrangements include:</p> <ul style="list-style-type: none"> <li>• language</li> <li>• shift work and rostering arrangements</li> <li>• timing of information and data provision</li> <li>• literacy and numeracy levels</li> <li>• workers with special needs</li> <li>• workplace organisational structures (for example, size of organisation, geographic, hierarchical)</li> <li>• cultural diversity</li> <li>• management approach</li> <li>• workplace culture and approach to OHS by managers, supervisors and employees.</li> </ul>
<p><b>Controls</b></p>	<p>The devices and methods of controlling the effect of the hazard so that the risk of injury is minimised. The ‘quality’ of the control is the level and reliability of the control compared with the level of risk. The quality of the controls is determined by:</p> <ul style="list-style-type: none"> <li>• the best available technology or approach should be applied when the most probable outcome is death or serious injury</li> <li>• the best practical technology or approach may be applied where the most probable outcome is less serious</li> </ul> <p>Refer also ‘Hierarchy of control’.</p> <p>Workplace factors that impact on the controls selected and the implementation include:</p> <ul style="list-style-type: none"> <li>• language</li> <li>• shift work and rostering arrangements</li> <li>• literacy and numeracy</li> <li>• workplace organisational structures (e.g. geographic, hierarchical)</li> <li>• cultural diversity</li> <li>• training required</li> <li>• workplace culture related to OHS, including commitment by managers and supervisors and compliance with procedures and training.</li> </ul>
<p><b>Control measures</b></p>	<p>Devices, systems (including work methods) or approaches that reduce</p>

	exposure to workplace hazards
<p><b>Crisis management plan</b></p>	<p>A flexible document that can cope with a broad range of crisis types and:</p> <ul style="list-style-type: none"> <li>• is approved at the highest levels of the organisation</li> <li>• focuses on management control</li> <li>• identifies responsibilities for decision making</li> <li>• details communication processes and psychological support</li> <li>• addresses arrangements with any contractors or shared tenancy</li> <li>• integrates the emergency response plans as well as recovery</li> <li>• incorporates dealing with external agencies and support</li> <li>• addresses planning for recovery before crisis occurs.</li> </ul> <p>Documentation for crisis management plan may include</p> <ul style="list-style-type: none"> <li>• policy, emergency response structure, initial response instructions for various roles/areas, responsibility and authority of individual roles, warning systems, training requirements, resource inventory for response and recovery, program review and monitoring processes; and</li> <li>• crisis risk management documentation, such as risk management team lists, communications strategies, identification of issues, risk assessments/evaluations, vulnerability profiles, risk registers and treatment strategies.</li> </ul> <p>The term ‘emergency management’ may also apply but ‘crisis management’ infers a more holistic approach encompassing the full range of business affairs.</p>
<p><b>Dangerous Goods (DG)</b></p>	<p>Those gases, liquids and solids identified and classified under the internationally agreed system which is followed in Australia and that are subject of so called ‘dangerous goods’ standards and legislation.</p> <p>The objective of the Dangerous Goods legislation is to control the storage, handling and transport of DGs to protect the safety of workers, the public, property and the environment. While dangerous goods may also be hazardous the terms should not be confused.</p>
<p><b>Dangerous parts of plant</b></p>	<p>Potential contact or entrapment points to which the operator may be exposed during:</p> <ul style="list-style-type: none"> <li>• operation</li> <li>• examination</li> <li>• lubrication</li> <li>• adjustment</li> <li>• maintenance.</li> </ul>
<p><b>Design</b></p>	<p>The process of bringing together innovation, aesthetics, and functionality to plan and create a product, process or system to meet the artistic, industrial or performance requirement of an individual or group. The Design Process involves a series of activities where an idea is conceived, shaped, developed, produced and then acted upon to produce a designed-product. It also includes any subsequent alteration of a designed-product (redesign or retrofit).</p>
<p><b>Design process</b></p>	<p>The stages of the design process include:</p> <p>The concept design phase considers preliminary design options, which</p>

are assessed against product specifications to determine the best preliminary design to be developed. This phase includes concept design, research and development, feasibility and risk management (including OHS risks).

The detailed design phase develops the selected design to its final state. It includes research and development, feasibility studies, concept and detail design, technical and functional specifications, plans and drawings, operational systems, construct/manufacture options and detailed quantities, cost and risk analysis (including analysis of OHS risks).

**Designed-product**

The item to be designed, including a built environment, structure, an item of plant or equipment, chemical, work system or process; or any other physical attribute or system associated with either the work or its interface with people.

**Duty of care**

Arises from common law but is enshrined in OHS statute law and / that places into a legal form a moral duty to anticipate possible causes of injury and illness and to do everything reasonably practicable to remove or minimise these possible causes of harm.

The key factors relating to duty of care are that:

- duty of care applies wherever there is special relationship (employer – employee, employer-contractor, supervisor – work team member, tradesperson-apprentice)
- duty of care applies to all circumstances of the relationship
- individual duty of care cannot be delegated (but roles and functions may be delegated)
- applies personally to individuals
- applies to all risks that are foreseeable and preventable
- includes the concept of ‘reasonable’.

**Elements of systematic approaches to managing OHS including OHSMs**

A list of key requirements or major principles that are combined in a methodical and ordered manner to minimise the risk of injury or ill health in the workplace; and may include processes of OHS planning, allocation of resources, communication and consultation, hazard management, record keeping and reporting, training and competency, and review and evaluation for ongoing improvement of OHS.

**Emergency**

Events such as:

- serious injury events
- emergencies requiring evacuation
- fires and explosions
- hazardous substance and chemical spills
- explosion and bomb alerts
- security emergencies, such as armed robberies, intruders and disturbed persons
- internal emergencies, such as loss of power or water supply and structural collapse
- external emergencies and natural disasters, such as flood, storm and traffic accident impacting on the organisation.

May also be referred to ‘hazardous event’.

**Emergency agency**

Includes fire, police, ambulance, relevant government departments,

hazardous materials response teams (HAZMAT) and OHS authorities

<b>Emergency control organisation (ECO) is:</b>	Structured group within the organisation that includes roles such as emergency controller, communications recorder, media liaison and employee support.
<b>Emergency equipment</b>	Includes: <ul style="list-style-type: none"><li>• First Aid equipment</li><li>• eye wash shower or portable eye washes</li><li>• fire extinguishers and equipment</li><li>• communication equipment</li><li>• evacuation alarms</li><li>• evacuation equipment, especially that for disabled persons</li><li>• torches</li><li>• clothing items such as coloured hats and vests.</li></ul>
<b>Emergency stops and warning devices</b>	Are fitted to plant and equipment that have a risk of entrapment or other hazard and must be: <ul style="list-style-type: none"><li>• prominently, clearly and durably marked</li><li>• coloured red (push buttons, bars or handles)</li><li>• unable to be affected by electrical or electronic circuit malfunction</li><li>• fitted where risk assessment identifies a need.</li></ul>
<b>Enforcement</b>	Processes and instruments available to the OHS regulator under legislation may include: <ul style="list-style-type: none"><li>• prosecution</li><li>• prohibition notices</li><li>• improvement notices</li><li>• on-the-spot fines</li><li>• provisional improvement notices.</li></ul>
<b>Epidemiology</b>	The study of the distribution and determinants of disease within human populations. Patterns of injury or illness in groups of people are studied to determine causes, identify groups at risk and to identify and evaluate methods of treatment and prevention.
<b>Ergonomics</b>	The study of the relationship between people, the equipment they use and their physical and social work environment.
<b>Ergonomic interventions</b>	Includes: <ul style="list-style-type: none"><li>• design of tools</li><li>• design of workplaces</li><li>• design of products</li><li>• design of equipment</li><li>• design of work systems, processes or organisation including work flow, planning and control</li><li>• job design</li><li>• development of new decision making processes</li><li>• new forms and organisations of work</li></ul>

<b>Ergonomic tools and databases</b>	<p>May include:</p> <ul style="list-style-type: none"><li>• engineering models</li><li>• Australian and International Standards</li><li>• Australian and International anthropometric databases</li></ul>
<b>Explosive substance</b>	<p>Substance that explodes if it comes into contact with heat, flame, an ignition source or incompatible substance.</p>
<b>Fail-to-safe</b>	<p>Design feature of equipment that ensures if there is a failure or defect in the product, or another factor such as loss of power, then the product is left in a safe condition.</p>
<b>Functional areas and management systems</b>	<p>Other than OHS but that impact on the management of OHS may include:</p> <ul style="list-style-type: none"><li>• strategic planning</li><li>• purchasing, procurement and contracting</li><li>• logistics</li><li>• HR, IR and personnel management, including payroll</li><li>• engineering and maintenance</li><li>• information, data and records management</li><li>• finance and auditing</li><li>• environmental management</li><li>• quality management.</li></ul>
<b>Guarding</b>	<p>Devices fitted to machinery to separate the operator from dangerous parts of the machine. Devices may include:</p> <ul style="list-style-type: none"><li>• permanently fixed physical barriers where no access of any part of a person is required</li><li>• interlocking physical barriers where access to dangerous areas is required during operation</li><li>• physical barriers securely fixed by means of fasteners or devices</li><li>• presence-sensing safeguarding systems.</li></ul>
<b>Hazard</b>	<p>A source or a situation with a potential for harm in terms of human injury or ill-health, damage to property, damage to the environment, or a combination of these.</p>
<b>Hazards of long latency</b>	<p>Conditions, illnesses and other health risks that result from longer term exposure to specific triggers such as chemicals, noise, radiation and psychosocial factors.</p>
<b>Hazards of low frequency/high consequence</b>	<p>High impact events that occur rarely such as explosions, fires and building collapses but may result in very serious injury, death or multiple death situations.</p>
<b>Hazard identification</b>	<p>The process of identifying sources of harm. Hazard identification may be required:</p> <ul style="list-style-type: none"><li>• at design or pre purchase of buildings, equipment and materials</li><li>• at commissioning or pre-implementation of new processes or practices</li></ul>

- before new forms of work and organisation of work are implemented
- before changes are made to workplace, equipment, work processes or work arrangements
- as part of planning major tasks or activities, such as equipment shutdowns
- following an incident report
- when new knowledge becomes available
- at regular intervals during normal operations
- prior to disposal of equipment, buildings or materials.

Different methods may be used to identify hazards including observation; consultation with workers, clients or other users; trial of models or prototypes; review of technical standards and other information sources; monitoring and measurement.

**Hazard identification tools and processes**

Include:

- analysis of incident investigations
- analysis of incident, injury and claims statistics
- workplace inspections
- job safety analysis (JSA)
- audits
- cause and effect diagrams
- surveys
- review of research and industry literature

**Hazardous event**

Includes incidents with the potential to seriously harm life, health, property, the environment or a combination. May also be referred to as 'emergencies'.

**Hazardous substance**

A substance that is listed on the National Commission's *List of Designated Hazardous Substances* (NOHSC:10005) or has been classified as a hazardous substance by the manufacturer or importer in accordance with the National Commission's *Approved Criteria for Classifying Hazardous Substances* (NOHSC:1008).

**Hazardous substance register**

Listing of all the hazardous substances that are used or produced in a workplace together with a current Material Safety Data Sheet for each substance. May also contain risk assessments for individual hazardous substances.

**HAZCHEM**

An initial response emergency action code that provides information vital to emergency services to enable them to stabilise the incident scene during the early stages of a HAZMAT incident. The Code is displayed on emergency information panels on transport vehicles and on signs on buildings. HAZCHEM codes are assigned to chemicals on the basis of their flammability, toxicity, reactivity and other relevant chemical and physical properties.

**HAZMAT**

A contraction of the words 'hazardous materials' and may be used in a range of circumstances including HAZMAT emergency response units, HAMAT emergency response equipment and HAZMAT registers of hazardous substances.

**HAZOP (Hazard and**

An advanced risk analysis technique that involves a systematic review of

<b>Operability Study)</b>	a process to determine risks and risk minimisation strategies.
<b>Health and safety representative</b>	An employee, elected by the workgroup, who represents the OHS interests of the people with whom they work. The function is carried out in addition to the normal work role. Processes for election of health and safety representatives, their role and rights are specified in State and Territory legislation.
<b>Health promotion</b>	The promotion of health, especially as a workplace program, designed to improve and enhance employee health undertaken as a complementary activity to the prevention of work-related injury and disease.  Also called wellness.
<b>Health surveillance</b>	Monitoring or checking individuals for the purpose of identifying changes due to exposure to hazards in the workplace. May include biological monitoring.
<b>Hierarchy of control</b>	The priority order in which hazard and risk controls should be considered with the eventual outcome often being a combination of measures. The prime emphasis is on: <ul style="list-style-type: none"><li>• elimination, and where this is not practicable, minimisation of risk by:<ul style="list-style-type: none"><li>○ substitution</li><li>○ isolating the hazard from personnel</li><li>○ engineering controls</li><li>○ administrative controls (e.g. procedures, training)</li><li>○ personal protective equipment (PPE).</li></ul></li></ul>
<b>Hot work</b>	Involves using equipment that generates heat, sparks, flames or any other sources of ignition in an atmosphere that may be flammable. Includes work with welders, cutters including oxygen cutters, power tools, grinding, mobile phones.  Hot work can also include breaking into 'live' equipment or performing work on live equipment that has the potential to release its contents (eg hot tap in chemical plants).
<b>Housekeeping</b>	Describes workplace and personal routines designed to improve hygiene and safety, eg cleaning up spills and keeping walkways, exits and traffic areas clear.
<b>Incident</b>	An event that has caused or has the potential for injury, ill-health or damage. ('Incident' is the preferred term rather than 'accident')
<b>(Sources of OHS) Information:</b>	May be internal and include: <ul style="list-style-type: none"><li>• hazard, incident and investigation reports</li><li>• workplace inspections</li><li>• incident investigations</li><li>• minutes of meetings</li><li>• Job Safety Analyses (JSAs) and risk assessments</li><li>• organisational data such as insurance records, enforcement notices and actions, workers compensation data, OHS performance data</li><li>• reports and audits</li><li>• material safety data sheets (MSDSs) and registers</li></ul>

- employees handbooks
- employees including questionnaire results
- OHS advisors
- manufacturer manuals and specifications.

Or external, including:

- regulatory bodies and OHS Acts regulations, codes and guidance material
- other relevant legislation
- National Occupational Health and Safety Commission (NOHSC) and Australian Bureau of Statistics
- databases such as national and State injury data and NICNAS (National Industrial Chemicals Notification and Assessment Scheme)
- OHS specialists and consultants
- newspapers and journals, trade/industry publications
- internet sites
- industry networks and associations including unions and employer groups
- OHS professional bodies
- research information .

**Isolation**

*Also called 'lock-out' and 'tag-out'.*

A safety device system that includes devices such as isolating switches, locks, safety bars, shields, full pressure blanks, spectacle blanks to lock controls, especially moving parts, equipment, systems or devices with stored energy, to an 'off' position while a worker is in a vulnerable position such as carrying out maintenance on rotating equipment, and electrical and hydraulic systems.

Isolation systems generally use locking switches that need keys to open the lock and are used in conjunction with a danger tag system that promotes greater safety consciousness amongst the workforce for all situations in which danger to persons could arise from:

- the operation of machinery, plant or equipment
- the flow of steam, electricity, gases or liquids
- the use of faulty or unsafe plant and equipment
- include multiple locking systems and involve written authorisation by a competent person

**Job Safety Analysis (JSA)**

Process of examining all aspects of a task to identify hazards and conditions with a potential for injury or ill health with the objective of developing risk controls including written job instructions.

**Legislation relevant to OHS**

Includes Commonwealth and relevant State / Territory OHS specific acts and regulations as well as:

- workers compensation
- privacy legislation
- contract law
- trade practices
- criminal law
- common law

- industrial relations law
- equal employment opportunity and anti- discrimination law

<b>Life-cycle</b>	All phases in the life of a product. Specific phases depend on the type of product but may include design, development, manufacture, construction, assembly, import, supply, distribution, sale, hire, lease, storage, transport, installation, erection, commissioning, use or operation, consumption, maintenance, servicing, cleaning, adjustment, inspection, repair, modification, refurbishment, renovation, recycling, resale, decommissioning, dismantling, demolition, discontinuance, disposal.
<b>Likelihood</b>	The likelihood of the occurrence of the consequence, not the likelihood of the hazard or the particular scenario.
<b>Locked out</b> <i>See 'Isolation'</i>	<p>Equipment, which is not to be operated for any reason, may be pad-locked, or otherwise prevented from operation using a keyed lock. A lockout may be accompanied by a tag out, or a lock out system may incorporate a tag.</p> <p>Lockout means the isolation by a mechanical device, generally a lock, which, when applied at the source, physically prevents the control to any electrical or mechanical equipment being turned on.</p>
<b>Manual handling</b>	The use of force applied by a person to lift, move, carry, push, pull or otherwise move or restrain an animate inanimate object.
<b>Material Safety Data Sheet (MSDS)</b>	Document describing the properties and hazards of a material or substance including statements about its chemical and physical properties, health hazards, precautions for use and safe handling instructions. All manufacturers and suppliers of chemicals are obliged to produce an MSDS for each hazardous chemical.
<b>Monitoring</b>	Involves the use of valid and suitable techniques to estimate the exposure of employees to a hazard.
<b>Musculoskeletal disorder (MSD)</b>	An injury, illness or disease that arises in whole or part from manual handling in the workplace, whether occurring suddenly or over a prolonged period of time. (Does not include injuries caused by crushing, entrapment or cut resulting primarily from the mechanical operation of plant.
<b>Occupational Overuse Syndrome (OOS)</b>	Previously called RSI and refers to arrange of conditions characterised by persistent discomfort and pain in and around joints and associated with repeated movement of the joint. Recent State and Territory legislation tends to group these conditions with those arising from manual handling as Musculoskeletal Disorders.
<b>OHS inspection</b>	<p>The process of physically examining and evaluating the extent to which hazards and risks exists, and /or particular OHS requirements, procedures or standards are being met.</p> <p>Refer also to 'workplace inspection'.</p>
<b>OHS specialists</b>	<p>Include:</p> <ul style="list-style-type: none"><li>• safety professionals</li><li>• ergonomists</li><li>• occupational hygienists</li></ul>

	<ul style="list-style-type: none"> <li>• safety engineers</li> <li>• injury management advisors</li> <li>• health professionals.</li> </ul>
<b>Operator certification</b>	The process by which a certificate to use or operate industrial equipment is issued by a certifying authority.
<b>OHS management system (OHSMS)</b>	<p>That part of the organisation’s overall management system that covers developing, implementing, reviewing and maintaining the activities for managing OHS. It is NOT a standard, a commercial package or folders on the shelf; however it may involve use of OHS management systems developed in the workplace to meet the OHS situation in that particular workplace.</p> <p>Also referred to in broader context as systematic approaches to managing OHS.</p>
<b>Operational controls for plant and equipment</b>	<p>Should:</p> <ul style="list-style-type: none"> <li>• be suitability identified</li> <li>• have nature and function clearly indicated</li> <li>• be readily and conveniently located</li> <li>• be guarded to prevent unintentional activation</li> <li>• be capable of locking in ‘off’ position to enable disconnection of all motive power and forces</li> <li>• be of ‘fail safe’ type.</li> </ul>
<b>Participative arrangements</b>	Arrangements that inform employees and other stakeholders of OHS matters, seek their input and offer opportunity to participate in decisions that may impact on their OHS. May also be referred to as ‘consultative arrangements’, but ‘participation’ implies a higher level of involvement.
<b>Permit to work</b>	<p>A written authority document such as hot work and confined space entry that:</p> <ul style="list-style-type: none"> <li>• includes approval to undertake work and activities including tests, measurements and monitoring</li> <li>• is authorised by a responsible or designated person directly in control of the work</li> <li>• certifies appropriate precautions and controls to be followed</li> <li>• incorporates checklists, conditions and actions such as the frequency and duration of the work and atmospheric tests</li> <li>• follows recognised industry standard recording practices.</li> </ul>
<b>Plant</b>	<p>As defined in National Standard for Plant includes:</p> <ul style="list-style-type: none"> <li>• machinery, equipment (including scaffolding), appliance, implement or tool and any other component, fitting or accessory</li> <li>• fixed and or specified plant as cited in commonwealth, State and Territory OHS legislation</li> <li>• mobile plant and load shifting equipment</li> <li>• pressure equipment such as boilers, pressure vessels and pressure piping</li> <li>• electrical installation and plant such as wiring, accessories, fittings, consuming devices, control and protective gear, converters and</li> </ul>

generators.

<b>Plant Registration</b>	The administrative process by which a certifying authority or State OHS regulator requires an organisation or industry to register plant, machinery and equipment.
<b>Personal protective equipment (PPE)</b>	<p>Equipment designed to be worn by a person to provide protection from hazards, and may include:</p> <ul style="list-style-type: none"><li>• head protection</li><li>• face and eye protection</li><li>• respiratory protection</li><li>• hearing protection</li><li>• hand protection</li><li>• clothing and footwear.</li></ul> <p>Personal protective equipment is considered the least satisfactory control measure.</p>
<b>Policies and procedures</b>	<p>Relevant to OHS include:</p> <ul style="list-style-type: none"><li>• policies and procedures underpinning OHS including those for hazard and incident reporting, OHS communication, consultation, issue resolution and risk management</li><li>• quality system documentation</li><li>• purchasing and contracting procedures</li><li>• documents describing how tasks, projects, inspections, jobs and processes are to be undertaken</li><li>• standard operating procedures, work instructions</li><li>• job or batch sheets, recipes</li><li>• operators manuals</li><li>• employee and contractor handbooks</li><li>• job/task statements.</li></ul>
<b>Positive performance indicators</b>	Focus on assessing how successfully a workplace is performing through measuring OHS processes.
<b>(OHS) Records</b>	<p>Requirements for OHS record keeping may be defined in:</p> <ul style="list-style-type: none"><li>• OHS legislation and regulations governing reporting of incidents and maintenance of records related to specific hazards, including chemical registers and material safety data sheets (MSDSs)</li><li>• privacy legislation</li><li>• organisational procedures.</li></ul> <p>OHS records may include:</p> <ul style="list-style-type: none"><li>• hazard and incident reports, first aid records</li><li>• risk assessments</li><li>• hazardous substances and dangerous good registers, MSDSs</li><li>• risk registers</li><li>• OHS audit and inspection reports</li><li>• maintenance and testing records</li><li>• OHS training records</li></ul>

- outcomes of health surveillance and environmental monitoring
- workers compensation claims and return to work records.

OHS records must be stored taking account of:

- privacy
- confidentiality
- enabling access to personal records, within legislative requirements
- commercial in confidence issues as appropriate.

**(OHS) Reporting requirements**

Under legislation include serious injury and serious incident reporting to OHS authorities.

**(OHS) Responsibilities**

Those with legislated OHS responsibilities include:

- company director
- manager
- supervisors
- OHS representatives
- employees and contractors
- designers, manufacturers, installers, suppliers.

**Residual risk**

That risk that is unable to be designed out of a product or process.

**Risk**

The chance of something occurring that will result in injury or damage. It is measured in terms of consequences (injury or damage) and likelihood of the consequence.

See 'Consequence' and 'Likelihood'.

**Risk analysis**

Analysing the risk to:

- identify factors influencing the risk and the range of potential consequences
- effectiveness of existing controls
- likelihood of each consequence considering exposure and hazard level
- combining these in some way to obtain a level of risk.

Factors influencing the risk may be associated with

- equipment
- work environment
- work organisation
- task
- the individual/operator
- frequency and duration of exposure
- number of people exposed/ involved.

**Risk assessment**

Risk assessment is a two-step process that involves risk analysis and risk evaluation.

Risk assessment as required under various OHS legislation does not necessarily require this second step of evaluation.

See 'Risk Analysis' and 'Risk evaluation'.

<b>Risk evaluation</b>	Comparison of risk with pre-established criteria for tolerance (or as low as reasonably achievable) and the subsequent ranking of risks requiring control. This activity will usually be carried out by or in conjunction with others with advanced OHS skills and knowledge.
<b>Risk management</b>	The whole systematic process directed towards identifying hazards, assessing the risk and developing controls to minimise the risk and monitoring the effectiveness of the controls (and taking further action as required).
<b>Risk ranking</b>	A process of rating risks according to their severity and likelihood. Common systems are based on matrices or nomograms but are usually highly subjective.
<b>Risk register</b> <i>Also referred to as Hazard Register</i>	Includes: <ul style="list-style-type: none"><li>• a list of hazards, their location and people exposed</li><li>• a range of possible scenarios or circumstances under which these hazards may cause injury or damage</li><li>• the results of the risk assessment, and may also include;</li><li>• possible control measures and dates for implementation.</li></ul>
<b>Safe Design</b>	A design process that generates options to eliminate hazards, or minimise potential risk to health and safety of those who make the product and those that use it by involving decision makers and considering OHS risks throughout the life cycle of the designed product.
<b>Stakeholders</b>	In workplace OHS include: <ul style="list-style-type: none"><li>• managers</li><li>• supervisors</li><li>• health and safety and other employee representatives</li><li>• OHS committees</li><li>• employees and contractors</li><li>• the community.</li></ul>
<b>Standards</b>	Relevant to OHS include: <ul style="list-style-type: none"><li>• OHS regulations and standards developed by OHS regulators</li><li>• national standards (NOHSC)</li><li>• Australian standards</li><li>• International national standards</li><li>• industry standards</li><li>• codes of practice</li><li>• exposure standards</li><li>• guidance notes.</li></ul>
<b>Statute Law</b>	Law created by legislation passed by government (acts and regulations) as distinct from common law.

<b>(OHS) plan:</b>	<p>A document that:</p> <ul style="list-style-type: none"><li>• is usually developed annually but may be developed for a shorter or longer period</li><li>• reviewed regularly</li><li>• has OHS performance indicators (ie objectives and targets that are achievable and practical) reflecting systematic approaches to managing OHS.</li></ul>
<b>System of work</b>	<p>The overall process of work including:</p> <ul style="list-style-type: none"><li>• method by which the work is carried out</li><li>• organisation of the work</li><li>• selection and maintenance of tools and equipment</li><li>• supervision and training</li><li>• selection of workers</li><li>• allocation of tasks and responsibilities.</li></ul>
<b>Systemic approach to managing OHS</b>	<p>Requires:</p> <ul style="list-style-type: none"><li>• comprehensive processes that are combined in a methodical and ordered manner to minimise the risk of injury or ill health in the workplace</li><li>• processes of planning, allocation of resources, communication and consultation, hazard management, record keeping and reporting, training and competency, and review and evaluation for ongoing improvement.</li></ul> <p>Factors that may impact on the implementation of a systematic approach to managing OHS may include:</p> <ul style="list-style-type: none"><li>• barriers to communication, such as language/literacy</li><li>• workplace culture issues, such as management commitment, supervisors' approach to compliance and general acceptance of the priority of safety</li><li>• diversity of workers</li><li>• structural factors, such as multiple locations, shift work and supervisory arrangements.</li></ul>
<b>Tag out</b>	<p>See 'Isolation'.</p>
<b>Technical advisors</b>	<p>To the OHS function may include:</p> <ul style="list-style-type: none"><li>• legal practitioners</li><li>• engineers (such as design, acoustic, mechanical, civil)</li><li>• security and emergency response personnel</li><li>• workplace trainers and assessors</li><li>• maintenance and trade persons.</li></ul>
<b>Wellness</b>	<p>See 'Health promotion'.</p>
<b>Workplace policies</b>	<p>Comprise written statements of employer's intentions and how the employers will action those intentions in the workplace. For example: OHS, access and equity, discrimination and manual handling.</p>

**Workplace inspection**

Process of examining the workplace, usually with the aid of a checklist, to identify hazards and level of compliance with workplace procedures.

*Some terms in the glossary have been taken from, or modified from the CCH Occupational Health and Safety Glossary, 1992 and National Guidelines for Integrating OHS Competencies into National Industry Competency Standards [NOHSC: 7025 (1998)] 2<sup>nd</sup> edition.*



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2  
Index of Competency Standard Units**

**Volume 2 of 2**

**Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008**

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## Volume 2 Part 2

### Index of Competency Standard Units

In this Electrotechnology Training Package (UEE06) there are approximately 500 competency standard units, arranged into sixteen (16) disciplines for ease of presentation and to facilitate quick access and referencing for finding relevant competency standard units for users.

#### Disciplines

A – Assembly	I – Instrument and control
B – Broadcast	J – Refrigeration and air conditioning
C – Commercial	K – Renewable and sustainable energy
D – Computer systems	L – Imported
E – Cross discipline	M – Hazardous areas
F – Data and voice communications	N – Rail systems
G – Electrical	P – Restricted and specialist
H – Electronic	R – Research

All of the competency standard units have been developed in accordance with DEST requirements with minor enhancements. All Parts in Volume 2 of this Training Package form an integrated component of each competency standard unit and must be included when developing learning strategies and assessment processes. Importantly, each competency standard unit is interrelated and linked with the Definitions/Glossary and an Essential Knowledge and Associated Skills (EKAS) sections of the Volume. Each competency standard unit has listed within its essential knowledge and associated skills section a unique essential knowledge and associated skills clause number and title

EKAS have been separated from the competency standard units to facilitate user friendliness for interpretation, applicability and future maintenance, however the EKAS section forms an integral part of each competency standard unit, and all assessment evidence activities and reporting processes shall include and confirm achievement of the relevant EKAS specifications.

No competency standard unit is to be used in isolation or exported without these interrelated components.

For detailed information on competency standard units, including their structure, refer to *Volume 1, Part 1 Qualifications* and *Volume 1, Part 2 Competency Standards*.

#### Coding Structure

The competency standard units have been coded with a Discipline code. Units in any one Discipline may range across a number of AQF levels. Refer to the section covering the Qualification Structure of Volume 1 Part 1 Qualification Framework to determine the relevant unit(s) pertaining to the qualification(s) required.

Unit Number										
U	E	E	N	E	E	H	0	2	4	A
<b>Industry - EE-Oz Training Standards identifier</b>			<b>Training Package identifier</b>			<b>Discipline ← letters →</b>	<b>Unit Numbers 001 to 999</b>			<b>Version</b>

U = Utilities – DEST Identifier

EE = EE-Oz Training Standards – ElectroComms and EnergyUtilities Industry Skills Council Identifier

N = National – Training Package identifier

EE = Electrical and Electronics

H = Discipline (eg H = Electronic)

*Number* = unit number identifier

A = Version

### Possible Skill Clusters CSUs

Some competency standard units (CSUs) may appear within this section and/or within a qualification within this Training Package but they can be delivered and assessed independently of any qualification.

Typically, these CSUs relate to work functions associated with regulatory or specialised functions. They may augment or be incidental to existing competencies held by individuals or be required for workplace entry associated with OHS issues.

All of any prerequisite requirements must be met for each competency standard unit.

The independent competency standard units are listed in Volume1 Part 1 – Qualifications Framework. For the complete competency standard unit refer to the respective Discipline sections.

## Essential Knowledge and Associated Skills

### Introduction

The Essential Knowledge and Associated Skills (EKAS) play an integral part in each unit of competence and must be taken into account when developing learning strategies and assessment tools. This separate essential knowledge and associated skills forms an integral part of each competency standard unit, and all assessment evidence activities and reporting processes are to incorporate this specification. In determining strategies for delivery regard is to be had in the preferred use of industry EKAS learning specifications to assure consistency and reliability of outcomes. The information supplied below has been recommended by industry in providing the underpinning support towards deeming a person competent in a unit or units of competence.

### Outline of Essential Knowledge and Associated Skills construction

Since Essential Knowledge and Associated Skills can be common across some units, the Electrotechnology Industry has adopted a layout of incorporating Clause Numbers and Clause Titles in each unit of competency under Section 6.1. The numbers and titles have been group into Topics that best suit the industry and training providers. A Clause Number has been allocated for this Training Package. The number 2 aligns to this section of Volume 2 of the Training Package and the number following the dot point refers to the category as shown in the table below. The topic areas are as follows:

Clause number	Topic areas
2.1	Cables, conductors and terminations
2.2	Common, commercial, processes and enterprise specific knowledge and skills
2.3	Control technologies
2.4	Communications and computer technologies
2.5	Drawings, diagrams, schedules, manuals, standards and regulations
2.6	Electrical applications and apparatus
2.7	Electrical installations and systems
2.8	Electrical principles
2.9	Electronic principles and applications
2.10	Electronic communications technology
2.11	Equipment and tools

- 2.12 Instrumentation
- 2.13 Maintenance and repair
- 2.14 Rail signalling
- 2.15 Refrigeration and air conditioning apparatus
- 2.16 Refrigeration and air conditioning installations
- 2.17 Refrigeration and air conditioning principles and applications
- 2.18 Safety
- 2.19 Special requirements
- 2.20 Sustainable energy and environment
- 2.21 System, control and automated

### **ESI — Transmission Distribution and Rail Training Package**

- T2.4 HV Switching

### **Essential Knowledge and Associated Skills (EKAS) are detailed in Volume 2 — Part 2.2**

It includes two appendices mapping the relationship between Essential Knowledge and Associated Skills and Competency Standard Units and :

- **Appendix 1** — Competency Standard Units to Essential Knowledge and Associated Skills Relationship
- **Appendix 2** — Essential Knowledge and Associated Skills to Competency Standard Units Relationship

This information is provided to assist users in developing holistic training support materials for respective qualifications and/or competency standard units.



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1A  
A – Assembly Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## UEENEEA001A Assemble electronic apparatus

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers fitting and inter connecting of electronic sub assemblies. It encompasses the safe use of hand tools, powered tools, identifying components, high reliability soldering, following set procedures and work instructions and keeping work records.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  There are no prerequisite competencies for this unit.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and Numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      3      Writing      3      Numeracy      3
<b>Application of the Unit</b>	<b>3)</b>  This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.
<b>License to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.
<b>Competency Field</b>	<b>4)</b>  Assembly

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to assemble electronic components.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established OHS risk control measures for work preparation are followed</p> <p>1.3 Work instructions are obtained and understood</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others</p> <p>1.5 Materials required for work are obtained in accordance with established routines and procedures</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety</p>
2 Assemble electronic components.	<p>2.1 Established OHS risk control work measures are followed</p> <p>2.2 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures</p> <p>2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures</p> <p>2.4 Interconnections are made to comply with industry/enterprise standards.</p> <p>2.5 Work is completed in acceptable timeframe given environment and workplace conditions</p>
3 Check quality of assembled components.	<p>3.1 Established OHS risk control measures for work completion are followed</p> <p>3.2 Quality of assembled component is checked against enterprise/industry standards</p> <p>3.3 Prescribed solutions are used where corrective actions to assembled components are necessary</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and assembling electronic apparatus.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.11.11.2 Surface mount soldering techniques

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by assembling at least two different electronic apparatus consisting of a chassis, printed circuit board, adjustment components and interconnections in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble electronic apparatus as described in 7) and including:
    - A Following assembly instructions.
    - B Correctly selecting and placing components.
    - C Making connection without damaging components.
    - D Adhering to quality procedures.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling electronic apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEA002A Select electronic components

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
		<b>Developing and using skills within a real workplace</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 3.2

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEA002A Select electronic components

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers the identifying and selecting electronic components for assembly from job specifications. It encompasses working safely, interpreting job specifications, identifying components by colour code and markings and following quality procedures and work instructions.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  There are no prerequisite competencies for this unit.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and Numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      3      Writing      3      Numeracy      3
<b>Application of the Unit</b>	<b>3)</b>  This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.
<b>License to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.
<b>Competency Field</b>	<b>4)</b>  Assembly

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to select electronic components.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures for work preparation are followed.</p> <p>1.3 Work instructions are obtained and understood.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.</p> <p>1.5 Materials required for the work are obtained in accordance with established routines and procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Select electronic components.	<p>2.1 Established OHS risk control work measures are followed.</p> <p>2.2 Electronic components are selected, sorted and placed in accordance with work instructions and established routines.</p> <p>2.3 Prescribed solutions are used to resolve issues with supply of component.</p> <p>2.4 Routine quality checks are conducted to ensure components comply with enterprise / industry standards.</p> <p>2.5 Work is completed in acceptable timeframe given environment and workplace conditions.</p>
3 Complete work report.	<p>3.1 Established OHS risk control measures for work completion are followed.</p> <p>3.2 Work report forms/data sheets on components are completed accurately.</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and the selection of electronic components.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.1.1 Electronic component basics

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by selecting components for at least two different electronic apparatus consisting of a chassis, printed circuit board, adjustment components and interconnections in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Select electronic components as described in 7) and including:
  - A Following job specifications
  - B Identifying and selecting components
  - C Handling components without damaging them
  - D Adhering to quality procedures
  - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**  
This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in the selection of electronic components.

**Method of assessment**

**8.4)**  
This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEA001A Assemble electronic apparatus

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 3.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  1.5; 2.2	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.3	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.4; 2.3; 3.2 3.3	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## UEENEEA003A Set up and check electronic component placement machines

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the setting up of electronic circuit board assembly machines. It encompasses working safely, interpreting job specifications, identifying components by colour code and markings, following machine set-up routines and following quality procedures and work instructions.</p>						
<b>Pre-requisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEA001A Assemble electronic apparatus</p> <p>UEENEEA002A Select electronic components</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and Numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td>Reading</td> <td style="text-align: center;">3</td> <td>Writing</td> <td style="text-align: center;">3</td> <td>Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.</p>						
<b>License to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Assembly</p>						

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit of competency		Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.	
1	Prepare to set-up machine.	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures for work preparation are followed.
		1.3	Work instructions are obtained and understood
		1.4	Advice is sought from the work supervisor to ensure that work is co-ordinated effectively with others
		1.5	Materials required for the work are obtained in accordance with established routines and procedures
		1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2	Set-up machine.	2.1	Established OHS risk control work measures are followed
		2.2	Machines are checked as being isolated where necessary in strict accordance OHS requirements and procedures
		2.3	Electronic components are selected, sorted and placed in accordance with work instructions and established routines
		2.4	Machine is set up in accordance with routine instructions ensuring specified components are loaded correctly
		2.5	Prescribed solutions are used to resolve issues with supply of component
		2.6	Routine quality checks are conducted to ensure components comply with enterprise/industry standards
		2.7	Work is completed in acceptable timeframe given environment and workplace conditions
3	Complete work report.	3.1	Established OHS risk control measures for work completion are followed.
		3.2	Operational checks of machine are carried out in accordance with established routines to ensure quality outcome are met
		3.3	Work report forms/data sheets on components are completed accurately

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and setting up and checking electronic and component placement machines.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.11.16 Electronic component place equipment

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by setting up and checking electronic component machines in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most

effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Set-up and check electronic component placement machines as described in 7) and including:
  - A Following assembly job specifications.
  - B Identifying components.
  - C Handling components without damaging them.
  - D Conducting machine operation checks.
  - E Adhering to quality procedures.
  - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up and working pick and place machines.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEA001A Assemble electronic apparatus

UEENEEA002A Select electronic components

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  3.2	1
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### **Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.3; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEA004A Rework electronic sub assemblies

### Unit Descriptor

1)

This unit covers correcting and or modifying electronic sub assemblies. It encompasses working safely, high reliability de-soldering/soldering, checking components against job specifications, testing and following quality procedures.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEA001A Assemble electronic apparatus

UEENEEA002A Select electronic components

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEE003A Solve problems in extra-low voltage single path circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and Numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Assembly

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for rework.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 OHS risk control measures for work preparation are followed</p> <p>1.3 The nature of the rework is determined from documentation or from work supervisor to establish the scope of work to be undertaken</p> <p>1.4 Rework of subassemblies is coordinated with others involved in the work to ensure work schedules are met and safety measures are followed</p> <p>1.5 Sources of materials that may be required for the work are established in accordance with established procedures</p> <p>1.6 Tools and equipment required for rework are selected for their effectiveness and checked for correct operation and safety</p>
2 Carry out rework of sub assemblies.	<p>2.1 OHS risk control work measures and procedures are followed</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures</p> <p>2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures</p> <p>2.4 Components are de-connected and re-connected in accordance with principles and technology of connection methods used</p> <p>2.5 Work is carried out in compliance with quality procedures and enterprise/industry standards</p> <p>2.6 Rework of subassemblies is completed in acceptable timeframe and given environment and workplace conditions</p>
3 Check quality of reworked sub assemblies.	<p>3.1 OHS risk control measures for work completion are followed</p> <p>3.2 Quality of rework is checked against enterprise/industry standards</p>

- 3.3 Functional tests on reworked subassemblies are carried out in accordance with established routines
- 3.4 Actions are taken to rectify defects within the scope of established routines
- 3.5 Report forms/data sheets on rework of subassemblies are completed accurately

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and reworking electronic sub assemblies.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.6 Enterprise quality management system, basics
- 2.11.11.3 Printed circuit board repair techniques
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by reworking any electronic sub assembly in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in

a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Rework electronic sub assemblies as described in 7) and including:
    - A Following job specifications
    - B Using high reliability de-soldering/soldering techniques
    - C Removing and placing components without damage
    - D Adhering to quality procedures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in reworking electronic sub assemblies.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEA001A Assemble electronic apparatus

UEENEEA002A Select electronic components

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 3.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.4	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4; 3.3; 3.4	1
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.3; 3.4
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEA005A      Conduct functional and quality tests on assembled electronic apparatus**

### **Unit Descriptor**

**1)**

This unit covers setting up testing equipment, testing functionality and inspecting quality of electronic apparatus. It encompasses working safely with electricity, testing device set-up, following testing and inspection procedures, interpreting and reporting testing and inspection results and making recommendations for dealing with defects.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEA004A    Rework electronic sub assemblies

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and Numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

**4)**

Assembly

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit of competency		Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.	
1	Prepare to conduct testing and inspection.	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	OHS risk control measures for work preparation are followed
		1.3	Documented apparatus functions and quality requirements are identified, obtained and understood
		1.4	Testing processes and procedures are reviewed and testing equipment is checked for correct operation and safety
		1.5	Apparatus testing and inspection is coordinated with others involved in the work to ensure work schedules are met and safety measures are followed
2	Conduct apparatus tests.	2.1	OHS risk control work measures and procedures are followed
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
		2.3	Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures
		2.4	Testing is conducted in accordance with principles and technology of electrical measurement
		2.5	Test results are interpreted within the scope of required functionality and quality
3	Conduct apparatus inspection.	3.1	OHS risk control work measures and procedures are followed
		3.2	Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures
		3.3	Apparatus is inspected for compliance with quality/industry standards
		3.4	Work is completed in acceptable timeframe and given environment and workplace conditions
4	Report on apparatus testing and inspection.	4.1	Recommendations on repairs to defects are reported within the scope of established procedures
		4.2	Report forms/data sheets on testing and inspection are completed accurately

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices, conducting functional and quality tests on assembled electronic apparatus.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.11.18 Electronic assembly functional and quality testing

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to conducting functional and quality tests on assembled electronic apparatus in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most

effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Conduct functional and quality tests on assembled electronic apparatus as described in 7) and including:
  - A Following job specifications.
  - B Selecting and using testing and measuring device correctly.
  - C Interpreting test results.
  - D Identifying visual defects.
  - E Reporting test results.
  - F Recommending appropriate actions for dealing with defect apparatus.
  - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting functional and quality tests on assembled electronic apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 3.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2; 3.3	2

**Skills Enabling 8.7)**

**Employment**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.3; 3.2; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEA006A Apply lead-free soldering techniques

**Unit Descriptor** 1)  
 This unit covers connecting/de-connecting electronic components using lead-free soldering. It encompasses working safely, high reliability soldering/de-soldering, checking components against job specifications, testing and following quality procedures.

**Prerequisite Unit(s)** 2)

**Competencies** 2.1)  
 There are no prerequisite competencies for this unit.

**Literacy and numeracy skills** 2.2)  
 Participants are best equipped to achieve competency in this unit if they have reading, writing and Numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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**Application of the Unit** 3)  
 This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training.

**License to practise** 3.1)  
 The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field** 4)  
 Assembly

### ELEMENT

### PERFORMANCE CRITERIA

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

- |   |  |     |  |
|---|--|-----|--|
| 1 | Prepare to carryout lead-free soldering.   | 1.1 | OHS procedures for a given work area are identified, obtained and understood   |
|   |  | 1.2 | OHS risk control measures for work preparation are followed  |
|   |  | 1.3 | The nature of the work is determined from documentation or from work supervisor to establish the scope of work to be undertaken                          |
|   |  | 1.4 | Work is coordinated with others involved in the work to ensure work schedules are met and safety measures are followed.                                  |
|   |  | 1.5 | Materials required for the work are sourced and check for compliance with lead-free soldering requirements and in accordance with established procedures |
|   |  | 1.6 | Tools and equipment required for the work are selected for their effectiveness and checked for correct operation and safety                              |
| 2 | Carry out lead-free soldering              | 2.1 | OHS risk control work measures and procedures are followed   |
|   |  | 2.2 | Knowledge of lead-free soldering characteristic and requirements are applied to soldering/de-soldering operations  |
|   |  | 2.3 | Components are connected and de-connected in accordance with lead-free soldering principles and technology   |
|   |  | 2.4 | Work is carried out in compliance with quality procedures and enterprise/industry standards  |
|   |  | 2.5 | Lead-free soldering is completed in acceptable timeframe and given environment and workplace conditions  |
| 3 | Check quality of lead-free soldering work. | 3.1 | OHS risk control measures for work completion are followed   |
|   |  | 3.2 | Quality of lead-free is checked against enterprise/ industry standards.  |
|   |  | 3.3 | Functional tests on lead-free soldered connections are carried out in accordance with established routines   |
|   |  | 3.4 | Actions are taken to rectify defects within the scope of established routines.   |
|   |  | 3.5 | Report forms/data sheets on lead-free soldering work are completed accurately  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and reworking electronic sub assemblies.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.6 Enterprise quality management system, basics

2.11.11.4 Lead-free soldering technology

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by applying lead-free soldering technology to any of the following in an environment designed specifically for the purpose.

- printed circuit board assembly,
- electronic sub-assembly rework,
- discrete component connections, and
- electronic equipment repair.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to

include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance

with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Apply lead-free soldering technology as described in 7) and including:

- A Following job specifications
- B Using high reliability lead-free soldering/de-soldering techniques
- C Handling components without damage
- D Adhering to quality procedures
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in reworking electronic sub assemblies.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEA001A Assemble electronic apparatus

UEENEEA004A Rework electronic sub assemblies

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 3.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 3.3; 3.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 3.3; 3.4
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEA010A Assemble, mount and connect switchgear and controlgear

### Unit Descriptor

1)

This unit covers the assembling and mounting of switchgear and controlgear including the interconnections within a switchboard enclosure intended to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely, following standards, specifications and component manufacturers requirements, matching equipment with that specified, terminating cables and connecting wiring and completing necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the following competencies have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, schedules and service manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and Numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in a workplace specifically for the purpose of assembling control panels. In another workplaces a licence to practise may be required subject to regulation to undertake electrical work. However, practice in this unit is

subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Assembly

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1	Prepare to assemble, mount and connect switchgear and controlgear.	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures for work preparation are followed
		1.3	Work instructions, including layout and wiring diagrams, are obtained and understood.
		1.4	Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others
		1.5	Materials required for the work are obtained in accordance with established routines and procedures
		1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2	Assemble, mount and connect switchgear and controlgear.	2.1	Established OHS risk control work measures are followed
		2.2	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures
		2.3	Switchgear/controlgear is fitted in accordance with work instructions, standards and established routines
		2.4	Interconnections are made in accordance with work instructions, standards and established routines
		2.5	Routine quality checks are carried out in accordance with work instructions
		2.6	Completed switchboard is tested against work instructions and industry standards and in strict accordance with OHS risk control measures
		2.7	Procedures for referring non-routine events to immediate supervisor for directions are followed

	2.8	Work is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy practices.
3	Check quality of assembled switchgear/controlgear.	<p>3.1 Established OHS risk control measures for work completion are followed</p> <p>3.2 Quality of assembled switchboard panel is checked against work instructions and industry standards and in accordance with established routines</p> <p>3.3 Prescribed solutions are used where corrective actions to assembled components are necessary</p> <p>3.4 Work report forms are completed accurately and appropriate person(s) notified in accordance with established routine</p>

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices, assembling, mounting and connecting switchgear and control gear.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.6.2	Alternating current rotating machines
2.6.24.1	Switchgear/controlgear
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by assembling at least two different control panels comprising more than essential services and general supply main switches, metering and sub main controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble, mount and connect switchgear and controlgear as described in 7) and including:
    - A Following assembly instructions.
    - B Correctly selecting and placing, switchgear and control gear.
    - C Making connection without damaging switchgear/control.
    - D Adhering to quality procedures.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling, mounting and connecting switchgear and controlgear.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEA012A Make up and assemble bus bars

### Unit Descriptor

1)

This unit covers fabricating and assembling copper and aluminium bus bar for interconnections in switchboards and for specific plant and that has high current demand. It encompasses working safely and to standards and specifications, measuring, cutting, shaping and fixing bus bar and completing necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the following competencies have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, schedules and service manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and Numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

**License to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in a workplace specifically for the purpose of making up and assembling bus bars. In other workplaces, a licence to practise may be required subject to regulation to undertake electrical work. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Assembly

**ELEMENT****PERFORMANCE CRITERIA**

**5)** Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1	Prepare to make up and assemble bus bars.	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures for work preparation are followed
		1.3	Work instructions including layout and wiring diagrams are obtained and understood
		1.4	Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others
		1.5	Materials required for the work are obtained in accordance with established routines and procedures
		1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2	Make up and assemble bus bars.	2.1	Established OHS risk control work measures are followed
		2.2	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures
		2.3	Bus bars are formed/made up in accordance with work instructions, standards and established routines
		2.4	Bus bars are connected in accordance with work instructions, standards and established routines

- |   |                                      |   |   |
|---|--------------------------------------|---|---|
|   | 2.5                                  | Routine quality checks are carried out in accordance with work instructions   |   |
|   | 2.6                                  | Completed bus bar assembly is tested against work instructions and industry standards and in strict accordance with OHS risk control measures                     |   |
|   | 2.7                                  | Procedures for referring non-routine events to immediate supervisor for directions are followed   |   |
|   | 2.8                                  | Work is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy practices |   |
| 3 | Check quality of assembled bus bars. | 3.1   | Established OHS risk control measures for work completion are followed  |
|   |                                      | 3.2   | Quality of bus bar assembly is checked against work instructions and industry standards and in accordance with established routines |
|   |                                      | 3.3   | Prescribed solutions are used where corrective actions to assembled components are necessary  |
|   |                                      | 3.4   | Work report forms are completed accurately and appropriate person(s) notified in accordance with established routine                |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and making and assembling bus bars.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.1.5.2 | Bus bar techniques                        |
| 2.18.1  | Occupational Health and Safety principles |
| 2.18.2  | Electrical Safe Working practices         |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to making up at least two different bus bars assemblies one of which shall be custom made.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Making and assembling bus bars as described in 7) and including:
    - A Following assembly instructions.
    - B Forming and making up correctly.
    - C Terminating bus bars correctly.
    - D Adhering to quality procedures.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above in context of and specific resources for assessment, evidence should show demonstrated competency in the make up and assembly of bus bars.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEA013A Assemble and wire control panels

### Unit Descriptor

1)

This unit covers mounting control devices, wiring support in control panel enclosures and installing the interconnecting wiring. It encompasses working safely, following layout and circuit diagrams, mounting equipment, installing and terminating wiring, functional testing and completing necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the following competencies have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, schedules and service manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and Numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in a workplace specifically for the purpose of assembling control panels. In a other workplaces a licence to practise may be required subject to regulation to undertake electrical work. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Assembly

**ELEMENT****PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.	
1 Prepare to assemble and wire control panels.	1.1	OHS procedures for a given work area are identified, obtained and understood
	1.2	Established OHS risk control measures for work preparation are followed
	1.3	Work instructions, including layout and wiring diagrams, are obtained and understood.
	1.4	Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others
	1.5	Materials required for the work are obtained in accordance with established routines and procedures
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Assemble and wire control panels.	2.1	Established OHS risk control work measures are followed
	2.2	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures
	2.3	Control panels components are fitted in accordance with work instructions, standards and established routines
	2.4	Interconnections are made in accordance with work instructions, standards and established routines
	2.5	Routine quality checks are carried out in accordance with work instructions
	2.6	Completed control panel is tested against work instructions and industry standards and in strict accordance with OHS risk control measures
	2.7	Procedures for referring non-routine events to immediate supervisor for directions are followed

	2.8	Work is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy practices
3	Check quality of assembled control panels.	3.1 Established OHS risk control measures for work completion are followed
	3.2	Quality of assembled control panel is tested against work instructions and industry standards and in accordance with established routines
	3.3	Prescribed solutions are used where corrective actions to assembled components are necessary
	3.4	Work report forms are completed accurately and appropriate person(s) notified in accordance with established routine

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices, assembling and wiring control panels.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.1.5.1	Power cable and conductor terminations
2.3.1	Electrical control devices
2.3.2	Control circuit fundamentals
2.6.8.2	Single & three-phase transformers
2.6.24.2	Control panel wiring
2.7.4.1	Electrical installations, protection methods and devices
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by assembling at least two different control panels comprising controls for more than two electrical machines, electro-mechanical and/or electronic control and devices such as relays, timers, logic controllers, indicators,

switches/push buttons and the like.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble and wire control panels as described in 7) and including:
    - A Following assembly instructions.
    - B Selecting and placing components correctly.
    - C Making connection without damaging control panel components.
    - D Adhering to quality procedures.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

<b>assessment</b>	<p>This should include:</p> <ul style="list-style-type: none"> <li>• OHS policy and work procedures and instructions.</li> <li>• Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.</li> </ul> <p>These should be used in the formal learning/assessment environment.</p> <p>Note:</p> <p>Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.</p> <p>In addition to the resources listed above, evidence should show demonstrated competency in assembling and wiring control panels.</p>
<b>Method of assessment</b>	<p><b>8.4)</b></p> <p>This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.</p> <p>Note:</p> <p>Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.</p>
<b>Concurrent assessment and relationship with other units</b>	<p><b>8.5)</b></p> <p>There are no concurrent assessment recommendations for this unit.</p>
<b>Key competencies</b>	<p><b>8.6)</b></p> <p>Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.</p>

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	1

**Skills Enabling  
Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1B  
B – Broadcast**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## **UEENEEB001A      Operate and maintain an amateur radio communication station**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit deals with operation and maintenance of an amateur radio communication station suitable to HF, VHF and SHF communication using multiple modes of operation. It encompasses correct operating procedures, safe working practices, following written and oral instruction and procedures, basic testing techniques, dismantling and assembling apparatus, disconnecting and reconnecting components, and operating to the Standard Licence Level as prescribed by the Australian Communication Media Authority.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite competencies for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Reading</td> <td style="width: 5%;">2</td> <td style="width: 25%;">Writing</td> <td style="width: 5%;">2</td> <td style="width: 25%;">Numeracy</td> <td style="width: 5%;">2</td> </tr> </table>	Reading	2	Writing	2	Numeracy	2
Reading	2	Writing	2	Numeracy	2		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit may apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>License to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do require an Australian Communications and Media Authority (ACMA) licence to practise in the workplace provided equipment is not connected to permanent installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p>						

Broadcast

ELEMENT	PERFORMANCE CRITERIA
<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.</p>
<p>1 Prepare to operate an amateur radio communication station.</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for amateur radio activities</p> <p>1.3 The nature of the operation of activity is identified to be within the Amateur Radio Standard Licence Conditions Determination</p> <p>1.4 Sources of materials that may be required for the Amateur Radio activities are identified and utilised according to manufacturer specifications and established routines and procedures</p> <p>1.5 Interference to other services is recognised and attended to by good operating practices, and advice is sought from the ACMA to ensure interference to other services does not occur</p> <p>1.6 Resources, tools, apparatus and testing devices needed to carry out work are obtained and checked for correct operation and safety</p>
<p>2 Operate an amateur radio communication station.</p>	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed</p> <p>2.2 The need to test or measure equipment is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures</p> <p>2.3 Circuits/apparatus are checked as being isolated where necessary in strict accordance with OHS requirements and procedures</p> <p>2.4 Radio communications operating practices and procedures are demonstrated and are in accordance with established requirements</p>

- |   |                                     |  |
|---|-------------------------------------|--|
|   | 2.5                                 | Amateur radio communication station is operated in accordance with Standard Licence Operator’s level as prescribed by the Australian Communication Media Authority                                   |
|   | 2.6                                 | Methods for dealing with unexpected situations are selected on the basis of safety, discussions with appropriate persons and specified work outcomes   |
|   | 2.7                                 | Set-up is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles                                 |
| 3 | Maintain an Amateur Radio Station   |  |
|   | 3.1                                 | OHS work completion risk control measures and procedures are followed.   |
|   | 3.2                                 | Modules/sub-assemblies are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage.  |
|   | 3.3                                 | Apparatus is dismantled and assembled in accordance with manufacturer guidelines.  |
|   | 3.4                                 | Repairs are affected efficiently without damage to other components, apparatus or circuits and in accordance with established procedures   |
|   | 3.5                                 | Repairs are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices                 |
|   | 3.6                                 | Apparatus is assembled in an appropriate sequence with all modules/sub-assemblies and parts correctly placed, secured and connected in accordance with manufacturer guidelines and industry practice |
|   | 3.7                                 | Repaired radio equipment, where appropriate, is tested and returned to service to ensure operating parameters are not exceeded   |
|   | 3.8                                 | Procedures for referring non-routine events to appropriate authorities are followed  |
|   | 3.9                                 | Work and operating area is cleaned and made safe in accordance with established procedures   |
| 4 | Identify and assemble amateur radio |  |
|   | 4.1                                 | Established OHS risk control measures and procedures for carrying out the work are followed  |

communication equipment and associated apparatus	4.2	Requirements for the item to be assembled are identified
	4.3	Item is assembled in accordance with established procedures and relevant engineering standards
	4.4	Assembled unit is tested to ensure that the operating parameters of the station will not be compromised
	4.5	Adjustments are made to the equipment where required to optimise reception
	4.6	Commission the equipment as constructed for on air performance.
	5 Complete work and maintain reports	5.1
5.2		Work site is cleaned and made safe in accordance with established procedures
5.3		Adjustment settings are documented and appropriate person(s) notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out radio station operation, basic maintenance and assembly of radio communication equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.10.32 Amateur radio communication principles, practices, and technical overview

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to carrying out the operation and maintenance of an amateur radio communication station.

The operation and maintenance shall be limited to:

- the requirements as prescribed by the Australian Communications and Media Authority, Amateur Operator Certificate of Proficiency (Standard) Syllabus Documentation and Licence Conditions Determination, and

- Assembly of an antenna and power supply or equivalent item of apparatus to industry standards, that may include minor soldering

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

The Australian Communications and Media Authority and the Wireless of Australia have established agreed minimal assessment requirements for licensing of amateur radio stations, including the minimal requirements for assessors.

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required, regulatory requirements and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to

consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Operate and maintain an amateur radio station, dismantling and assembling apparatus and disconnecting and reconnecting components including:
    - A Following manufacturer service instructions and licence conditions determination for radio station assembly and dismantling, including transmitter, power, measurement and adjustment.
    - B Demonstrating on HF and VHF correct operating procedure as prescribed by the Australian Communications and Media Authority.

- C Connecting and disconnecting components to radio equipment manufacturer requirements and appropriate engineering requirements, including minor soldering
- D Identifying common types of transmission lines, coaxial connectors, antennas and symbols.
- E Assembling a radio frequency choke used for the elimination of potential interference.
- F Testing a coaxial cable for continuity and standing wave ratio, including explaining how to correct a high standing wave ratio, and demonstrating the use of a signal strength metre.
- G Demonstrating the correct use of voice repeaters with and without continuous tone coded squelch system (CTCSS) and/or dual tone multi frequency signalling.
- H Correctly using an amateur radio according to ACMA licence and standard operating procedures
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Relevant Australian and International standards for the assembly and operation of an amateur radio station.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling, dismantling and operating

an amateur radio station, including the assembly of an antenna, power supply unit or an equivalent circuit.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: NA	

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.7	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.8



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1C  
C – Commercial Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## UEENEEC001A Maintain documentation

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the maintenance of the variety of documentation required to record work activities, purchases and expenses and compliance obligations. It encompasses documentation typically required in an electrotechnology enterprise, work instructions and procedures and time management.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite competencies for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Commercial</p>						

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1	Prepare to maintain documentation	1.1	Documentation requirements and methods for the organisation/enterprise are identified, obtained and understood
		1.2	Advice is sought from the work supervisor, when necessary, to ensure the work is correctly documented and coordinated effectively with others
		1.3	Forms required to document work are obtained in accordance with established routines and procedures
		1.4	OHS risk assessment and control measures are documented before work is commenced in accordance with established routine/procedures.
2	Maintain documentation.	2.1	Activities are documented promptly and at the appropriate time in accordance with established routine/procedures
		2.2	Documentation is checked for accuracy and clarity and any anomalies corrected
		2.3	Where applicable, signature is obtained from an appropriate person and the person's identification documented
		2.4	Where applicable, a copy of any required documentation is forwarded to an appropriate person in accordance with established routine/procedures
		2.5	Procedures for referring non-routine events to immediate supervisor for directions are followed

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining documentation.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records

2.2.20 Computer use basics

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by maintaining documentation in any electrotechnology enterprise information system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will

contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain documentation in any electrotechnology enterprise information system, including:
    - A Following enterprise documentation requirements.
    - B Enabling documentation to communicate clearly to others.
    - C Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining documentation.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with any unit or units that require formal documentation.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.1; 2.5

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.1; 1.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.5

## **UEENEEC002A Source and purchase material/parts for installation or service jobs**

### **Unit Descriptor**

**1)**

This unit covers sourcing and purchasing/ordering materials/parts for installation or service jobs. It encompasses following job specification, using manufacturer’s catalogues, making telephone, internet or email enquiries, selecting compliance materials and completing the necessary purchasing documentation.

Note: In the unit the value of materials for installation jobs is limited to \$20k.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit shall be assessed only after all core units have been achieved in the electrotechnology discipline in which competency in the unit is sought.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 3 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Commercial

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Establish the extent of the materials to be purchased.	1.1 OHS procedures for a given work area are identified, obtained and understood
	1.2 Established OHS risk control measures and procedures are followed
	1.3 The extent of installation or service work is determined from job specifications, drawings or results of service calls
	1.4 Materials required for the work are determined from job specifications or requirements resulting from service calls
	1.5 Materials or parts required are documented in accordance with established routine procedures
2 Source and purchase materials.	2.1 Sources of materials are obtained based on availability and price using catalogues, computers and/or telephone in accordance with established routine procedures
	2.2 Approval to purchase alternative materials/parts is sought from an appropriately qualified and authorised person
	2.3 Price for the supply of materials/parts, particularly non-standard high cost items, is sought in accordance with routine established procedures
	2.4 Approval to purchase materials or parts is obtained in writing from the customer or other authorised person in accordance with established routine procedures
	2.5 Purchases are initiated based on price and availability of materials/parts within the required timeframe and in accordance with established routine procedures
3 Document material purchases.	3.1 Material or part purchases are allocated against the appropriate jobs

- 3.2 Material or part purchases are documented in accordance with established routine procedures.

Note:

Prices to include discounts, GST and delivery costs

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and the sourcing and purchasing of material/parts for installation or service jobs.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.2.7 Enterprise purchasing systems
- 2.2.20 Computer use basics
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to sourcing and purchasing materials/parts for at least two installation job, two service job or one installation and one service job and may apply to any of the following electrotechnology disciplines.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire Protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Source and purchase material/parts for installation or service jobs as described in 7) including:
    - A Establishing the extent of work on which purchases are to be based.
    - B Determining the material or parts required accurately.
    - C Using at least two methods to source materials.
    - D Obtaining quotations for supply of materials/parts.
    - E Obtaining approval to purchase.
    - F Establishing availability and arranging supply within the required timeframe.
    - G Documenting material/part purchases accurately.

- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in sourcing and purchasing of material/parts for installation or service jobs.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEED001A Use basic computer applications

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 2.3; 3.1; 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.2; 3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.2

## **UEENEEC003A Provide quotations for installation or service jobs**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers providing quotations for installation and service work not exceeding \$20k. It encompasses following job specification, using manufacturer catalogues, making telephone, internet or email enquiries, selecting compliance materials, pricing materials and labour costs, completing the necessary quotation documentation and applying the necessary customer relations protocols.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed only after all core units have been achieved in the electrotechnology discipline in which competency in the unit is sought.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Reading</td> <td style="width: 5%;">4</td> <td style="width: 25%;">Writing</td> <td style="width: 5%;">4</td> <td style="width: 25%;">Numeracy</td> <td style="width: 5%;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 4 level or higher.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Commercial</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Establish the extent of the work.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures are followed</p> <p>1.3 The extent of installation or service work is determined from job specifications and discussions with customer and/or other appropriate person(s)</p> <p>1.4 The extent of installation or service work on which a quotation is to be given is documented as a job specification and agreement sought with customer or other appropriate person(s)</p> <p>1.5 OHS and other regulatory requirements are incorporated in the work on which the quotation is based</p> <p>1.6 Requests for alterations to the job specification are negotiated with customer or other appropriate person(s) and within the constraints imposed by regulatory requirements</p> <p>1.7 A date by which the quotation is to be submitted is agreed with the customer and/or other appropriate person(s)</p>
2 Develop quotations.	<p>2.1 Material take-offs are performed accurately and checked against job specification(s)</p> <p>2.2 Materials, labour and other costs are determined from industry standard labour rates, enterprise costing arrangements and/or material suppliers</p> <p>2.3 Quotations are checked for accuracy in costing and against job specification</p>
3 Document and submit quotation.	<p>3.1 Quotation is documented in accordance with established policies and procedures</p> <p>3.2 Quotation is submitted to customer within by an agreed date</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and providing quotations for installation and service jobs

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

2.2.1	Enterprise communication methods
2.2.2	Enterprise work activities records
2.2.5	Enterprise customer relations protocols
2.2.8	Enterprise costing methods
2.2.10	Job costing techniques
2.18.1	Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to providing at least one quotation for an installation job and one for a service job. The value of the jobs shall not exceed \$20k and may apply to any of the following electrotechnology disciplines.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire Protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide quotations for installation and service jobs on at least two occasions as described in 7) including:
    - A Establishing the extent of work on which the quotation is to be based.
    - B Taking of material accurately.
    - C Costing the job appropriately.
    - D Checking the quotation.
    - E Documenting the quotation clearly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing quotations for installation or service jobs.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEED001A Use basic computer applications relevant to a workplace

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.6; 3.1	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.6; 2.2; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.6; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.6; 2.1 to 2.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.6

## **UEENEEC004A Prepare specifications for the supply of materials and equipment for electrotechnology projects**

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers writing technical specifications for the supply of materials and equipment for electrotechnology projects. It encompasses establishing the performance requirements, comparing requirements with available materials and equipment, specifying material and equipment performance requirements and documenting the specifications.						
<b>Prerequisite Unit(s)</b>	<b>2)</b>						
<b>Competencies</b>	<b>2.1)</b>  Competency in this unit shall be assessed only after all core units have been achieved in the electrotechnology discipline in which competency in the unit is sought.						
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<b>3)</b>  This unit is suitable for competency development employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.						
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.						
<b>Competency Field</b>	<b>4)</b>  Commercial						

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1	Establish performance and prescribed parameters of materials and equipment.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	The extent of the work is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).
		1.3	The performance and prescribed parameters of materials and equipment is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).
		1.4	A date by which the materials and equipment is required is determined from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).
		1.5	Activities are planned to meet scheduled timeframe in consultation with others involved in the work.
2	Prepare specifications for supply of materials and equipment.	2.1	Manufacturer specifications and limitations of materials and equipment are sought.
		2.2	Manufacturer specifications and limitations are compared with the established performance and prescribed parameters for materials and equipment.
		2.3	Sources and availability of materials and equipment are established in accordance with organisation policies and procedures.
		2.4	Specifications for the supply of materials and equipment, including required evidence of compliance are developed in accordance with enterprise policy.
		2.5	Additional services such as equipment set up/commissioning and training are incorporate in the specifications where relevant.
		2.6	Solutions to unplanned events are implemented consistent with enterprise policy.
3	Document and submit quotation.	3.1	Material and equipment supply documentation is forwarded to appropriate person for processing in accordance with enterprise policies.

3.2 Material and equipment supply documentation is filed in accordance with enterprise policies

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## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and preparing specifications for the supply of materials and equipment for electrotechnology projects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

2.2.11.2 Specification development

2.18.1 Occupational Health and Safety principles

2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to preparing specifications for the supply of materials and equipment for at least two different electrotechnology projects exceeding \$20k and may apply to any of the following electrotechnology disciplines.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire Protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Prepare specifications for the supply of materials and equipment for electrotechnology projects as described in 7) including:
    - A Ascertain the extent of the project accurately
    - B Establishing performance and prescribed parameters of materials and equipment
    - C Comparing material/equipment manufacturer specifications and limitations with the established performance and prescribed parameters accurately
    - D Including in the specifications required evidence of compliance
    - E Identifying the need for additional services and incorporating this in the specification
    - F Documenting the specifications clearly
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in preparing specifications for the supply of materials and equipment for electrotechnology projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEED001A Use basic computer applications relevant to a workplace

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.1	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.1	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 3.1	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEC005A Estimate electrotechnology projects**

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers estimate material and labour costs for competitive quotation/tenders for work exceeding \$20k. It encompasses reading and understanding job specifications, material take-offs, determining labour and site requirements, costing and documenting.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  Competency in this unit shall be assessed only after all core units have been achieved in the electrotechnology discipline in which competency in the unit is sought.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      5      Writing      5      Numeracy      5
<b>Application of the Unit</b>	<b>3)</b>  This unit is suitable for competency development employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.
<b>Competency Field</b>	<b>4)</b>  Commercial

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Ascertain the extent of the project.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed.</p> <p>1.3 The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).</p> <p>1.4 A date by which the estimate is to be completed is determined from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).</p> <p>1.5 Activities are planned to meet scheduled timeframe in consultation with others involved in the work.</p>
2 Estimate project.	<p>2.1 Material take-offs are performed accurately and checked against job specifications.</p> <p>2.2 Materials, labour and other costs are determined from industry standard labour rates, enterprise costing arrangements and /or material suppliers.</p> <p>2.3 Sources and availability of materials and human resources needed for the project are established in accordance with organisation policies and procedures.</p> <p>2.4 Estimates are checked and revised where necessary, for accuracy in costing and against job specification, in consultation with appropriate person(s).</p> <p>2.5 Solutions to unplanned events are implemented consistent with enterprise policy.</p>
3 Document and submit quotation.	<p>3.1 Project estimates are documented in accordance with established policies and procedures.</p> <p>3.2 Quotation is forwarded to appropriate person(s) for inclusion in a submission within the specified timeframe.</p> <p>3.3 Quotation documentation is filed in accordance with established policies and procedures.</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and estimating electrotechnology projects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.11.1 Estimating techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to estimating at least two electrotechnology projects for a competitive quotation/tender. The value of the jobs shall exceed \$20k and may apply to any of the following electrotechnology disciplines.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire Protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Estimate electrotechnology projects as described in 7) including:
    - A Ascertaining the extent of the project accurately.
    - B Planning estimation work effectively.
    - C Estimating the job competitively.
    - D Checking the estimates accurately.
    - E Documenting the estimates clearly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in estimating electrotechnology projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEED001A Use basic computer applications relevant to a workplace

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.1	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.1	3

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.5

## UEENEEC006A Prepare tender submissions for electrotechnology projects

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the preparation of tender documents. It encompasses reading and understanding tender requirements and project specifications, verifying estimates and capacity to meet timelines, complying with legal requirements and documenting submissions.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after the following competencies have been confirmed.</p> <p>UEENEEC005A Estimate electrotechnology projects</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td>Reading</td> <td style="text-align: center;">5</td> <td>Writing</td> <td style="text-align: center;">5</td> <td>Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Commercial</p>						

### ELEMENT

### PERFORMANCE CRITERIA

<b>5) Elements describe the essential outcomes of a unit of competency</b>	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Ascertain tender requirements.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed.</p> <p>1.3 The extent of the work under the tender is determined from tender documents.</p> <p>1.4 Special conditions and requirements for lodging the tender are ascertained from tender documents.</p> <p>1.5 Appropriately competent person(s) is engaged to estimate material, labour and other costs.</p> <p>1.6 Activities are planned to meet specified tender closing date/time.</p>
2 Assemble tender submission.	<p>2.1 All inputs to the tender are obtained and checked with person(s) responsible for their development.</p> <p>2.2 Materials and human resources needed to complete the work under the conditions of the tender are confirmed with person(s) responsible.</p> <p>2.3 Legal advice is sought on contingent aspects of the tender.</p> <p>2.4 Contingency allowances are included in the tender in accordance with established policies and procedures.</p>
3 Document tender submission.	<p>3.1 Tender submission is documented in tender lodgement requirements and in accordance with established policies and procedures.</p> <p>3.2 Tender submission is checked for accuracy against tender documents and all other inputs and made ready for lodgement before the closing date/time.</p>

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## REQUIRED SKILLS AND KNOWLEDGE

**6)** This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and preparing tender submissions. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

2.2.12 Tendering requirements

2.18.1 Occupational Health and Safety principles

2.18.8.2 Occupational Health and Safety, enterprise responsibilities

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to preparing tender submissions for at least two electrotechnology projects. The tenders apply to any of the following electrotechnology disciplines.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire Protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where

- required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Prepare tender submissions for electrotechnology projects as described in 7) including:
    - A Ascertaining the extent of the work under the tender accurately
    - B Ascertaining special conditions and requirements for lodging the tender
    - C Planning tender submission work effectively
    - D Checking all input to the tender submission accurately
    - E Applying legal advise to contingent issues
    - F Documenting the tender submission ready for lodgement before the closing date/time
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in preparing tender submission for electrotechnology projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENED001A Use basic computer applications relevant to a workplace

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.1	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.1 to 2.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 2.1; 2.2	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: All	3

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.5 to 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEC007A Manage contract variations

### Unit Descriptor

1)

This unit covers estimating and negotiating variations to contracted work. It encompasses understanding the specification on which the contracted price is based, identifying contract variations, negotiating and using methods for submitting variations, documenting and applying customer relations protocols.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after all core units have been achieved in the electrotechnology discipline in which competency in the unit is sought.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Commercial

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1	Ascertain the terms of the contract.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures are followed.
		1.3	The extent of the work under the original contract price is ascertained from tender submission/acceptance documents and associated work specifications, plans and diagrams.
		1.4	Arrangements under the contract for costing and claiming variations are ascertained from tender submission/acceptance and contract documents.
2	Manage contract variations.	2.1	The extent of a variation is determined and formal variation issued by the customer representative or other appropriate person.
		2.2	Variation is priced in accordance with the contract and established policies and procedures.
		2.3	Variation approvals are negotiated with reference to contract obligations of both parties and in accordance with established policies and procedures.
		2.4	Variation resolution proceeding is initiated for variations not agreed to by the client representative.
		2.5	Approved variations are submitted for payment promptly and in accordance with established policies and procedures.
		2.6	Variations documents are forwarded to appropriate person(s) within the organisation in accordance with established policies and procedures.

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and managing contract variations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.11.1 Estimating techniques
- 2.2.14 Contracts, format, responsibilities and obligations

- 2.18.1 Occupational Health and Safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to managing at least five variations to electrotechnology contracts. The contracts may apply to any of the following electrotechnology disciplines

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire Protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that

can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s

- performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
- Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Manage contract variations as described in 7) including:
      - A Ascertaining the terms of the contract accurately.
      - B Ascertaining the contract arrangements for claiming variations.
      - C Pricing variation in accordance with the contract.
      - D Initiating variation resolution proceeding, where applicable.
      - E Negotiating contract variation approvals.
      - F Forwarding variation documentation appropriately.
      - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in managing contract variations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEED001A Use basic computer applications relevant to a workplace

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.1	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	3
How are problem solving skills	Refer to the following Performance Criteria for examples of application:	

applied?	2.4	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.5; 2.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4

## **UEENEEC008A      Receive and store materials and equipment for electrotechnology work**

### **Unit Descriptor**

**1)**

This unit covers the receiving and storing of materials and equipment for a construction site or workshop store. It encompasses receiving materials and equipment, checking consignment notes, storing materials and equipment and completing the necessary documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Note:**

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Receive materials and equipment.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control work measures and procedures are followed.
- 1.3 Documentation on pending material and equipment deliveries is read, and content and time of the delivery is understood.
- 1.4 Deliveries are checked against consignment documentation before they are received.
- 1.5 Discrepancies in deliveries are notified to work supervisor and supplier in accordance with established routines.
- 1.6 Materials and equipment are handled in strict accordance with OHS risk control work preparation measures and procedures.

2 Store materials and equipment.

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 Material and equipment are stored to prevent damage or loss in accordance with established routines.
- 2.3 Security of the stored materials and equipment is maintained in accordance with established routines.
- 2.4 Material and equipment documentation is forwarded to an appropriate person in accordance with established routine/procedures.

**REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and of receiving and storing materials and equipment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.2.9 Enterprise stock control methods
- 2.2.20 Computer use basics
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to receiving and storing materials and equipment for a construction site or workshop store.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical

equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Receive and store materials and equipment for electrotechnology work as described in 7) including:
    - A Determining content and time of pending deliveries from relevant documentation.
    - B Dealing with discrepancies in deliveries.

- C Storing and securing materials and equipment to prevent damage or loss.
- D Forwarding documentation appropriately.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in receiving and storing materials and equipment for electrotechnology work.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with any unit or units that require formal documentation.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.5

## **UEENEEC009A Provide quotations for inspection and compliance audit services**

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers providing quotations for compliance inspections and technical safety audits. It encompasses reading and understanding job specification, pricing labour and site costs, completing the necessary quotation documentation and applying the necessary customer relations protocols.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after all core units have been achieved in the electrotechnology discipline in which competency in the unit is sought.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 4 level or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Commercial</p>						

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1	Establish the extent of the work.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures are followed.
		1.3	The extent of inspection or audit service work is determined from job specifications and drawings and from discussions with customer and/or other appropriate person(s).
		1.4	The extent of inspection or audit service work on which a quotation is to be given is documented as a job specification and agreement sought with customer or other appropriate person(s).
		1.5	OHS and other regulatory requirements are incorporated in the work on which the quotation is based.
		1.6	A date by which the quotation is to be submitted is agreed with the customer and/or other appropriate person(s).
2	Develop quotations	2.1	Labour and other costs are determined from industry standard labour rates and/or enterprise costing arrangements.
		2.2	Costing is performed accurately and checked against job specifications.
		2.3	Quotations are checked for accuracy in costing and against job specifications.
3	Document and submit quotation.	3.1	Quotation is documented in accordance with established policies and procedures.
		3.2	Quotation is submitted to customer within by an agreed date.

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and providing quotations for inspection and compliance audit services. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

2.2.1 Enterprise communication methods

- 2.2.2 Enterprise work activities records
- 2.2.5 Enterprise customer relations protocols
- 2.2.8 Enterprise costing methods
- 2.2.10 Job costing techniques
- 2.18.1 Occupational Health and Safety principles

## **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to providing at least one quotation for an inspection job and one for compliance audit. The value of the jobs shall not exceeding \$20k and may apply to any of the following electrotechnology disciplines.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

## **Critical aspects of evidence required to**

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### **8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide quotations for inspection and compliance audit services as described in 7) including:
    - A Establishing the extent of work on which the quotation is to be based.
    - B Determining the extent of labour and other costs.
    - C Costing the job appropriately.
    - D Checking the quotation.
    - E Documenting the quotation clearly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and  
specific  
resources for  
assessment**
**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing quotations for inspection and compliance audit services.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENED001A Use basic computer applications relevant to a workplace

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.6; 3.1	3
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.3; 1.6; 2.2; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  1.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  All	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	1.3; 1.6; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.6; 2.1 to 2.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEC010A Deliver a service to customers

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the interacting with customers to identify and meet their service needs. It encompasses following community and enterprise policies and standards, identifying customer needs, identifying and resolving problems/issues and maintaining product/service quality.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>There are no prerequisite competencies to this unit</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'</p> <table border="0" style="width: 100%;"> <tr> <td>Reading</td> <td style="text-align: center;">3</td> <td>Writing</td> <td style="text-align: center;">3</td> <td>Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Commercial</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Interact with customers.	<p>1.1 Communication with customers is conducted in a professional and courteous manner according to established procedures.</p> <p>1.2 Customer enquiries are responded to promptly and politely and in accordance with established procedures.</p> <p>1.3 Personal dress and presentation is maintained in line with established procedures.</p> <p>1.4 Appropriate interpersonal skills are used to facilitate accurate and relevant exchange of information.</p>
2 Identify customer needs.	<p>2.1 Customer needs are assessed so that priorities for service delivery can be identified in accordance with established procedures.</p> <p>2.2 Appropriate questioning and active listening are used to determine customer needs.</p> <p>2.3 Customers are provided with information about available options for meeting their needs and assisted to identify their preferred option.</p> <p>2.4 Personal limitations in addressing customer needs are identified and where appropriate assistance is sought from appropriate personnel.</p>
3 Deliver a service to customers.	<p>3.1 Prompt customer service is provided to meet identified needs in accordance with established procedures.</p> <p>3.2 Service provided follows OHS policies and procedures and work is appropriately sequenced in accordance with requirements.</p> <p>3.3 Service provided is coordinated effectively with others involved on the work site.</p> <p>3.4 Customer complaints are handled sensitively and courteously in accordance with established procedures.</p> <p>3.5 Opportunities to enhance the quality of service and products are identified and taken whenever possible.</p>

4	Evaluate and complete service.	4.1	Own work is monitored and adjusted according to requirements for job quality, customer service and efficient resource use.
		4.2	Customer service records are inspected and verified after service is completed to ensure requirements are met.
		4.3	Appropriate personnel are notified of the completion of the repair work and details are documented in accordance with established procedures and requirements.
		4.4	Variations in the quality of service and/or products from required standards are detected and reported in accordance with established procedures.
		4.5	Additional information or follow-up action is completed in line with customer needs.

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and delivering a service to customers. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

2.2.1	Enterprise communication methods
2.2.2	Enterprise work activities records
2.2.4	Problem solving techniques
2.2.5	Enterprise customer relations protocols
2.2.6	Enterprise quality management system, basics
2.2.13	User instruction techniques
2.18.1	Occupational Health and Safety principles

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by delivering a service to customers in any of the electrotechnology disciplines.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

## **Critical aspects of evidence required to**

### **8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Deliver a service to customers as described in 7) including:
    - A Interacting with customers appropriately.
    - B Identifying customer needs accurately.
    - C Identifying and resolving customer issues promptly and amicably.
    - D Delivering a service.
    - E Reflecting on the completed service positively.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and  
specific  
resources for  
assessment****8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in delivering a service to customers.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with any unit or units that require formal documentation.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	1

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.2

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4

## UEENEEC012A Direct technical and non-technical enquiries to appropriate personnel

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers clarifying the nature of technical and non-technical enquiries of customers and co-workers and directing such enquiries to appropriate personnel. It encompasses working safely, applying appropriate knowledge to questioning enquirers, clarifying the point of an enquiry, directing enquiries appropriately and documenting actions.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>There are no prerequisite competencies for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Reading</td> <td style="width: 5%;">3</td> <td style="width: 25%;">Writing</td> <td style="width: 5%;">3</td> <td style="width: 25%;">Numeracy</td> <td style="width: 5%;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Commercial</p>						

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1	Interact with customers and co-workers	1.1	Communication with customers is conducted in a professional and courteous manner according to established procedures.
		1.2	Customer/co worker enquiries are responded to promptly and politely and in accordance with established procedures.
		1.3	Appropriate interpersonal skills are used to facilitate accurate and relevant exchange of information.
2	Direct enquirers to appropriate personnel	2.1	Customer/co-worker enquiries are assessed to determine whether the enquiry is technical or non-technical.
		2.2	Appropriate questioning and active listening are used, drawing on general knowledge of the specific electrotechnology discipline, to determine the nature of the enquiry.
		2.3	Customers are directed to appropriate personnel to respond to the enquiry.
		2.4	Appropriate personnel to whom the enquiry is directed are informed of the nature of the enquiry and identity of the enquirer.
		2.5	All enquiries and how they were responded to are documented in accordance with routine procedures.

## **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and directing technical and non-technical enquiries to appropriate personnel.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.2.5 Enterprise customer relations protocols
- 2.2.6 Enterprise quality management system, basics

2.2.22 Enterprise work/business coverage

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to directing technical and non-technical enquiries to appropriate personnel in any of the electrotechnology disciplines.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will

contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Direct technical and non-technical enquiries to appropriate personnel as described in 7) including:
    - A Interacting with customers appropriately.
    - B Identifying nature of the enquiry accurately.
    - C Directing the enquirer to the appropriate personnel.
    - D Informing appropriate personnel of the enquiry.
    - E Documenting all enquiries in accordance with routine

procedures.

- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in directing technical and non-technical enquiries to appropriate personnel.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with any unit or units that require formal documentation.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.2; 2.2	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
1 Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEC013A Participate in business equipment work and competency development activities**

### **Unit Descriptor**

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed with core and nominated elective units in a qualification.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant,

machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT PERFORMANCE CRITERIA**

<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Comply with business equipment industry/enterprise work policies and procedures</p>	<p>1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.</p> <p>1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.</p> <p>1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.</p>
<p>2 Monitor and respond to a personal competency development plan.</p>	<p>2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.</p> <p>2.2 All components of the competency development plan are followed diligently.</p> <p>2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.</p> <p>2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.</p> <p>2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.</p> <p>2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.</p>

- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. This unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant state/territory training act seeking to complete the qualification. Incorporate therein is the requirement for deployment of an approved competency development (training) plan.

The Plan specifies the competency standard units, which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans

- Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
    - Timely reporting of workplace exposures and practice
    - Supervisor confirmation of workplace exposures and practices in a structured workplace report
  3. Workplace evidence reporting:
    - Unit of work
    - Elements and performance of work
    - Range of items exposed to and practised on
    - Level of supervision received
    - Period of exposure
  4. Workplace evidence validation:
    - Currency of evidence
    - Authenticity of evidence
    - Sufficiency of evidence
  5. Workplace evidence reporting review:
    - Contribution towards progressive development for the qualification
    - Competency standard unit progressive reporting
    - Regular review of progress report
    - Timing of periodic monitoring/evaluation
    - Procedures for monitoring and analysing progress
    - Procedures for responding to anomalies in competency development
    - Procedures for liaison with the workplace supervisor
  6. Periodic evaluation of competency development (training) progress:
    - Stages of progress that are to be met in developing competent performance
    - Evaluation of progress against requisite stages of development towards competent performance
    - Implementation of remedial measures
    - Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in business equipment work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved
    - E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
    - F Reporting periodically the competency development

activities in accordance with requirements

- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- J Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC014A Participate in computer equipment work and competency development activities**

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the application of industry/enterprise policies in actively participating in work activities and in one’s own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed with core and nominated elective units in a qualification.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Commercial</p>						

### **ELEMENT**

### **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Comply with computer equipment industry/enterprise work policies and procedures	<p>1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.</p> <p>1.2 Clarification on how work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.</p> <p>1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.</p>
2 Monitor and respond to a personal competency development plan.	<p>2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.</p> <p>2.2 All components of the competency development plan are followed diligently.</p> <p>2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.</p> <p>2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.</p> <p>2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.</p> <p>2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.</p> <p>2.7 Obligations are met for periodic and timely reporting of competency development activities.</p> <p>2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

2.2.45	Responsibilities under a competency development plan
2.2.46	Methods of monitoring and reporting competency development activities
2.2.48	Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities

- Employee/Learner responsibilities
- Context of responsible parties:
  - Industry customs, work practices
  - Industry bodies – employer and employee representatives
  - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
  - Vocational and technical education system – AQF, credentials, AQTF
  - RTO training practices, requirements, administration, costs, and support services
- 2. Workplace practice and exposure:
  - Timely reporting of workplace exposures and practice
  - Supervisor confirmation of workplace exposures and practices in a structured workplace report
- 3. Workplace evidence reporting:
  - Unit of work
  - Elements and performance of work
  - Range of items exposed to and practised on
  - Level of supervision received
  - Period of exposure
- 4. Workplace evidence validation:
  - Currency of evidence
  - Authenticity of evidence
  - Sufficiency of evidence
- 5. Workplace evidence reporting review:
  - Contribution towards progressive development for the qualification
  - Competency standard unit progressive reporting
  - Regular review of progress report
  - Timing of periodic monitoring/evaluation
  - Procedures for monitoring and analysing progress
  - Procedures for responding to anomalies in competency development
  - Procedures for liaison with the workplace supervisor
- 6. Periodic evaluation of competency development (training) progress:
  - Stages of progress that are to be met in developing competent performance
  - Evaluation of progress against requisite stages of development towards competent performance
  - Implementation of remedial measures
  - Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in computer equipment work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved
    - E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
    - F Reporting periodically the competency development

activities in accordance with requirements

- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- J Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC015A Participate in custom electronic installations work and competency development activities**

### **Unit Descriptor**

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed with core and nominated elective units in a qualification.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.

Where the components of the custom electronic system are connected to the public telephone system facility, practice in the workplace is also subject to ACA regulations to undertake cabling work.

Note:

Units 'UEE NEEF001A and UEE NEEF002A provide the required skill and knowledge for registration in accordance with ACA

regulations for undertaking cabling work.

Practice in the workplace and during training is also subject to regulations directly related to OHS and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with custom electronic installations industry/enterprise work policies and procedures

- 1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained
- 1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
- 1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

- 2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
- 2.2 All components of the competency development plan are followed diligently.
- 2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
- 2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.

- 2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.
- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.
- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:

- Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
    - Timely reporting of workplace exposures and practice
    - Supervisor confirmation of workplace exposures and practices in a structured workplace report
  3. Workplace evidence reporting:
    - Unit of work
    - Elements and performance of work
    - Range of items exposed to and practised on
    - Level of supervision received
    - Period of exposure
  4. Workplace evidence validation:
    - Currency of evidence
    - Authenticity of evidence
    - Sufficiency of evidence
  5. Workplace evidence reporting review:
    - Contribution towards progressive development for the qualification
    - Competency standard unit progressive reporting
    - Regular review of progress report
    - Timing of periodic monitoring/evaluation
    - Procedures for monitoring and analysing progress
    - Procedures for responding to anomalies in competency development
    - Procedures for liaison with the workplace supervisor
  6. Periodic evaluation of competency development (training)

progress:

- Stages of progress that are to be met in developing competent performance
- Evaluation of progress against requisite stages of development towards competent performance
- Implementation of remedial measures
- Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included

in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in custom electronic installations work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities

- D Seeking clarification of how particular work is to be carried out and the procedures involved
- E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC016A Participate in voice and data communications work and competency development activities**

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the application of industry/enterprise policies in actively participating in work activities and in one’s own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed with core and nominated elective units in a qualification.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Commercial</p>						

### **ELEMENT**

### **PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1	Comply with voice and data communications industry/enterprise work policies and procedures	<p>1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained</p> <p>1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person</p> <p>1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person</p>
2	Monitor and respond to a personal competency development plan.	<p>2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons</p> <p>2.2 All components of the competency development plan are followed diligently</p> <p>2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued</p> <p>2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency</p> <p>2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures</p> <p>2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons</p> <p>2.7 Obligations are met for periodic and timely reporting of competency development activities</p> <p>2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.</p>

## REQUIRED SKILLS AND KNOWLEDGE

**6)** This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF

- RTO training practices, requirements, administration, costs, and support services
- 2. Workplace practice and exposure:
  - Timely reporting of workplace exposures and practice
  - Supervisor confirmation of workplace exposures and practices in a structured workplace report
- 3. Workplace evidence reporting:
  - Unit of work
  - Elements and performance of work
  - Range of items exposed to and practised on
  - Level of supervision received
  - Period of exposure
- 4. Workplace evidence validation:
  - Currency of evidence
  - Authenticity of evidence
  - Sufficiency of evidence
- 5. Workplace evidence reporting review:
  - Contribution towards progressive development for the qualification
  - Competency standard unit progressive reporting
  - Regular review of progress report
  - Timing of periodic monitoring/evaluation
  - Procedures for monitoring and analysing progress
  - Procedures for responding to anomalies in competency development
  - Procedures for liaison with the workplace supervisor
- 6. Periodic evaluation of competency development (training) progress:
  - Stages of progress that are to be met in developing competent performance
  - Evaluation of progress against requisite stages of development towards competent performance
  - Implementation of remedial measures
  - Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment,

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and

associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in voice and data communications work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved
    - E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
    - F Reporting periodically the competency development activities in accordance with requirements
    - G Periodically reviewing progress of the competency development activities in accordance with requirements
    - H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
    - I Progressing successfully against periodic or staged evaluative performance events according to requirements
    - G Seeking assistance to overcome difficulties in developing competency

- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC017A Participate in appliance servicing work and competency development activities**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the application of industry/enterprise policies in actively participating in work activities and in one’s own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed with core and nominated elective units in a qualification</p> <p>UEENEEJ061A     Verify compliance and functionality of appliances</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 33%;">Reading</td> <td style="width: 10%; text-align: center;">4</td> <td style="width: 33%;">Writing</td> <td style="width: 10%; text-align: center;">4</td> <td style="width: 14%;">Numeracy</td> <td style="width: 10%; text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Commercial</p>						

ELEMENT	PERFORMANCE CRITERIA	
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1 Comply with appliance servicing industry/enterprise work policies and procedures	1.1	Industry/enterprise policies and procedures for all work activities are identified and obtained.
	1.2	Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
	1.3	Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.
2 Monitor and respond to a personal competency development plan.	2.1	All aspects of the competency development plan are confirmed in consultation with appropriate persons.
	2.2	All components of the competency development plan are followed diligently
	2.3	Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
	2.4	Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
	2.5	Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.
	2.6	Modifications to the personal competency development plan are made in consultation with appropriate persons.
	2.7	Obligations are met for periodic and timely reporting of competency development activities.
	2.8	Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

2.2.45	Responsibilities under a competency development plan
2.2.46	Methods of monitoring and reporting competency development activities
2.2.48	Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities

- Employee/Learner responsibilities
- Context of responsible parties:
  - Industry customs, work practices
  - Industry bodies – employer and employee representatives
  - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
  - Vocational and technical education system – AQF, credentials, AQTF
  - RTO training practices, requirements, administration, costs, and support services
- 2. Workplace practice and exposure:
  - Timely reporting of workplace exposures and practice
  - Supervisor confirmation of workplace exposures and practices in a structured workplace report
- 3. Workplace evidence reporting:
  - Unit of work
  - Elements and performance of work
  - Range of items exposed to and practised on
  - Level of supervision received
  - Period of exposure
- 4. Workplace evidence validation:
  - Currency of evidence
  - Authenticity of evidence
  - Sufficiency of evidence
- 5. Workplace evidence reporting review:
  - Contribution towards progressive development for the qualification
  - Competency standard unit progressive reporting
  - Regular review of progress report
  - Timing of periodic monitoring/evaluation
  - Procedures for monitoring and analysing progress
  - Procedures for responding to anomalies in competency development
  - Procedures for liaison with the workplace supervisor
- 6. Periodic evaluation of competency development (training) progress:
  - Stages of progress that are to be met in developing competent performance
  - Evaluation of progress against requisite stages of development towards competent performance
  - Implementation of remedial measures
  - Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in appliance servicing work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved
    - E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
    - F Reporting periodically the competency development

activities in accordance with requirements

- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

This unit shall be assessed concurrently with other units in a qualification.

UEENEEJ061A      Verify compliance and functionality of appliances

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

**Skills Enabling  
Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC018A Participate in electrical machine repair work and competency development activities**

### **Unit Descriptor**

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed with core and nominated elective units in a qualification

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in

various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with electrical machine repair industry/enterprise work policies and procedures

- 1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.
- 1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
- 1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

- 2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
- 2.2 All components of the competency development plan are followed diligently.
- 2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
- 2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
- 2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.

- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.
- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)

- Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
    - Timely reporting of workplace exposures and practice
    - Supervisor confirmation of workplace exposures and practices in a structured workplace report
  3. Workplace evidence reporting:
    - Unit of work
    - Elements and performance of work
    - Range of items exposed to and practised on
    - Level of supervision received
    - Period of exposure
  4. Workplace evidence validation:
    - Currency of evidence
    - Authenticity of evidence
    - Sufficiency of evidence
  5. Workplace evidence reporting review:
    - Contribution towards progressive development for the qualification
    - Competency standard unit progressive reporting
    - Regular review of progress report
    - Timing of periodic monitoring/evaluation
    - Procedures for monitoring and analysing progress
    - Procedures for responding to anomalies in competency development
    - Procedures for liaison with the workplace supervisor
  6. Periodic evaluation of competency development (training) progress:
    - Stages of progress that are to be met in developing competent performance

- Evaluation of progress against requisite stages of development towards competent performance
- Implementation of remedial measures
- Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in electrical machine repair work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved

- E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC019A Participate in switchgear and controlgear work and competency development activities**

### **Unit Descriptor**

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed with core and nominated elective units in a qualification

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in

various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT PERFORMANCE CRITERIA**

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Comply with switchgear and controlgear industry/enterprise work policies and procedures</p>	<p>1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.</p> <p>1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.</p> <p>1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.</p>
<p>2 Monitor and respond to a personal competency development plan.</p>	<p>2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.</p> <p>2.2 All components of the competency development plan are followed diligently.</p> <p>2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.</p> <p>2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.</p> <p>2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.</p>

- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.
- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)

- Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
    - Timely reporting of workplace exposures and practice
    - Supervisor confirmation of workplace exposures and practices in a structured workplace report
  3. Workplace evidence reporting:
    - Unit of work
    - Elements and performance of work
    - Range of items exposed to and practised on
    - Level of supervision received
    - Period of exposure
  4. Workplace evidence validation:
    - Currency of evidence
    - Authenticity of evidence
    - Sufficiency of evidence
  5. Workplace evidence reporting review:
    - Contribution towards progressive development for the qualification
    - Competency standard unit progressive reporting
    - Regular review of progress report
    - Timing of periodic monitoring/evaluation
    - Procedures for monitoring and analysing progress
    - Procedures for responding to anomalies in competency development
    - Procedures for liaison with the workplace supervisor
  6. Periodic evaluation of competency development (training) progress:
    - Stages of progress that are to be met in developing competent performance

- Evaluation of progress against requisite stages of development towards competent performance
- Implementation of remedial measures
- Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in switchgear and controlgear work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved

- E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## UEENEEC020A Participate in electrical work and competency development activities

### Unit Descriptor

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEG005A    Verify compliance and functionality of general electrical installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with electrical industry/enterprise work policies and procedures

- 1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.
- 1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
- 1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

- 2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
- 2.2 All components of the competency development plan are followed diligently.
- 2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
- 2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
- 2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.

- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.
- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)

- Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
    - Timely reporting of workplace exposures and practice
    - Supervisor confirmation of workplace exposures and practices in a structured workplace report
  3. Workplace evidence reporting:
    - Unit of work
    - Elements and performance of work
    - Range of items exposed to and practised on
    - Level of supervision received
    - Period of exposure
  4. Workplace evidence validation:
    - Currency of evidence
    - Authenticity of evidence
    - Sufficiency of evidence
  5. Workplace evidence reporting review:
    - Contribution towards progressive development for the qualification
    - Competency standard unit progressive reporting
    - Regular review of progress report
    - Timing of periodic monitoring/evaluation
    - Procedures for monitoring and analysing progress
    - Procedures for responding to anomalies in competency development
    - Procedures for liaison with the workplace supervisor
  6. Periodic evaluation of competency development (training) progress:
    - Stages of progress that are to be met in developing competent performance

- Evaluation of progress against requisite stages of development towards competent performance
- Implementation of remedial measures
- Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in electrical work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved

- E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

This unit shall be assessed concurrently with other units in a qualification.

UEENEEG005A Verify compliance and functionality of general electrical installations

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC021A Participate in electronics and communications work and competency development activities**

### **Unit Descriptor**

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed with core and nominated elective units in a qualification

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States and Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as

apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with electronics and communications industry/enterprise work policies and procedures

- 1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.
- 1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
- 1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

- 2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
- 2.2 All components of the competency development plan are followed diligently.
- 2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
- 2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.

- 2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.
- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.
- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
  - Timely reporting of workplace exposures and practice
  - Supervisor confirmation of workplace exposures and practices in a structured workplace report
3. Workplace evidence reporting:
  - Unit of work
  - Elements and performance of work
  - Range of items exposed to and practised on
  - Level of supervision received
  - Period of exposure
4. Workplace evidence validation:
  - Currency of evidence
  - Authenticity of evidence
  - Sufficiency of evidence
5. Workplace evidence reporting review:
  - Contribution towards progressive development for the qualification
  - Competency standard unit progressive reporting
  - Regular review of progress report
  - Timing of periodic monitoring/evaluation
  - Procedures for monitoring and analysing progress
  - Procedures for responding to anomalies in competency development
  - Procedures for liaison with the workplace supervisor

6. Periodic evaluation of competency development (training) progress:
  - Stages of progress that are to be met in developing competent performance
  - Evaluation of progress against requisite stages of development towards competent performance
  - Implementation of remedial measures
  - Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in electronics and communications work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities

- D Seeking clarification of how particular work is to be carried out and the procedures involved
- E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of**

**8.4)**

**assessment**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills	Refer to the following Performance Criteria for examples of application:	

applied?	2.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC022A Participate in fire protection control work and competency development activities**

### **Unit Descriptor**

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed with core and nominated elective units in a qualification.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with fire protection control industry/enterprise work policies and procedures

- 1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.
- 1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
- 1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

- 2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
- 2.2 All components of the competency development plan are followed diligently.
- 2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
- 2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
- 2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.

- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.
- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)

- Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
    - Timely reporting of workplace exposures and practice
    - Supervisor confirmation of workplace exposures and practices in a structured workplace report
  3. Workplace evidence reporting:
    - Unit of work
    - Elements and performance of work
    - Range of items exposed to and practised on
    - Level of supervision received
    - Period of exposure
  4. Workplace evidence validation:
    - Currency of evidence
    - Authenticity of evidence
    - Sufficiency of evidence
  5. Workplace evidence reporting review:
    - Contribution towards progressive development for the qualification
    - Competency standard unit progressive reporting
    - Regular review of progress report
    - Timing of periodic monitoring/evaluation
    - Procedures for monitoring and analysing progress
    - Procedures for responding to anomalies in competency development
    - Procedures for liaison with the workplace supervisor
  6. Periodic evaluation of competency development (training) progress:
    - Stages of progress that are to be met in developing competent performance

- Evaluation of progress against requisite stages of development towards competent performance
- Implementation of remedial measures
- Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in fire protection control work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved

- E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC023A      Participate in gaming electronic work and competency development activities**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the application of industry/enterprise policies in actively participating in work activities and in one’s own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.</p>						
<b>Prerequisite Unit(s)</b>	<b>2)</b>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed with core and nominated elective units in a qualification.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Reading</td> <td style="width: 5%;">4</td> <td style="width: 25%;">Writing</td> <td style="width: 5%;">4</td> <td style="width: 25%;">Numeracy</td> <td style="width: 5%;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.</p> <p>Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p> <p style="text-align: center;">Note:</p> <p style="text-align: center;">1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as</p>						

elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT PERFORMANCE CRITERIA**

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>	
<p>1 Comply with gaming electronic industry/enterprise work policies and procedures</p>	<p>1.1</p>	<p>Industry/enterprise policies and procedures for all work activities are identified and obtained.</p>
	<p>1.2</p>	<p>Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.</p>
	<p>1.3</p>	<p>Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.</p>
<p>2 Monitor and respond to a personal competency development plan.</p>	<p>2.1</p>	<p>All aspects of the competency development plan are confirmed in consultation with appropriate persons.</p>
	<p>2.2</p>	<p>All components of the competency development plan are followed diligently.</p>
	<p>2.3</p>	<p>Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.</p>
	<p>2.4</p>	<p>Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.</p>
	<p>2.5</p>	<p>Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.</p>
	<p>2.6</p>	<p>Modifications to the personal competency development plan are made in consultation with appropriate persons.</p>

- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development

- (training) plans
- Parties involved in the competency development (training) plan
- Responsibilities of Parties:
  - RTO responsibilities
  - Role of State Training Authority (STA)
  - Employer responsibilities
  - Employee/Learner responsibilities
- Context of responsible parties:
  - Industry customs, work practices
  - Industry bodies – employer and employee representatives
  - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
  - Vocational and technical education system – AQF, credentials, AQTF
  - RTO training practices, requirements, administration, costs, and support services
- 2. Workplace practice and exposure:
  - Timely reporting of workplace exposures and practice
  - Supervisor confirmation of workplace exposures and practices in a structured workplace report
- 3. Workplace evidence reporting:
  - Unit of work
  - Elements and performance of work
  - Range of items exposed to and practised on
  - Level of supervision received
  - Period of exposure
- 4. Workplace evidence validation:
  - Currency of evidence
  - Authenticity of evidence
  - Sufficiency of evidence
- 5. Workplace evidence reporting review:
  - Contribution towards progressive development for the qualification
  - Competency standard unit progressive reporting
  - Regular review of progress report
  - Timing of periodic monitoring/evaluation
  - Procedures for monitoring and analysing progress
  - Procedures for responding to anomalies in competency development
  - Procedures for liaison with the workplace supervisor
- 6. Periodic evaluation of competency development (training) progress:
  - Stages of progress that are to be met in developing competent performance
  - Evaluation of progress against requisite stages of development towards competent performance
  - Implementation of remedial measures
  - Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in gaming electronic work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved
    - E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
    - F Reporting periodically the competency development

activities in accordance with requirements

- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies****8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC024A Participate in instrumentation and control work and competency development activities**

### **Unit Descriptor**

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed with core and nominated elective units in a qualification

UEENEEI012A      Verify compliance and functionality of process control installations

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as

elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with instrumentation and control industry/enterprise work policies and procedures

- 1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.
- 1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
- 1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

- 2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
- 2.2 All components of the competency development plan are followed diligently.
- 2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
- 2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
- 2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.
- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.

- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development

- (training) plans
- Parties involved in the competency development (training) plan
- Responsibilities of Parties:
  - RTO responsibilities
  - Role of State Training Authority (STA)
  - Employer responsibilities
  - Employee/Learner responsibilities
- Context of responsible parties:
  - Industry customs, work practices
  - Industry bodies – employer and employee representatives
  - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
  - Vocational and technical education system – AQF, credentials, AQTF
  - RTO training practices, requirements, administration, costs, and support services
- 2. Workplace practice and exposure:
  - Timely reporting of workplace exposures and practice
  - Supervisor confirmation of workplace exposures and practices in a structured workplace report
- 3. Workplace evidence reporting:
  - Unit of work
  - Elements and performance of work
  - Range of items exposed to and practised on
  - Level of supervision received
  - Period of exposure
- 4. Workplace evidence validation:
  - Currency of evidence
  - Authenticity of evidence
  - Sufficiency of evidence
- 5. Workplace evidence reporting review:
  - Contribution towards progressive development for the qualification
  - Competency standard unit progressive reporting
  - Regular review of progress report
  - Timing of periodic monitoring/evaluation
  - Procedures for monitoring and analysing progress
  - Procedures for responding to anomalies in competency development
  - Procedures for liaison with the workplace supervisor
- 6. Periodic evaluation of competency development (training) progress:
  - Stages of progress that are to be met in developing competent performance
  - Evaluation of progress against requisite stages of development towards competent performance
  - Implementation of remedial measures
  - Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in instrumentation and control work and competency development activities as detailed in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved
    - E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person

- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop

and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

This unit shall be assessed concurrently with other units in a qualification.

UEENEEI012A      Verify compliance and functionality of process control installations

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC025A Participate in refrigeration and air conditioning work and competency development activities**

### **Unit Descriptor**

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed with core and nominated elective units in a qualification

UEENEEJ009A      Verify compliance and functionality of refrigeration and air conditioning installations

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the

operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with refrigeration and air conditioning industry/enterprise work policies and procedures

- 1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.
- 1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
- 1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

- 2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
- 2.2 All components of the competency development plan are followed diligently.
- 2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
- 2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
- 2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.

- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.
- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)

- Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
    - Timely reporting of workplace exposures and practice
    - Supervisor confirmation of workplace exposures and practices in a structured workplace report
  3. Workplace evidence reporting:
    - Unit of work
    - Elements and performance of work
    - Range of items exposed to and practised on
    - Level of supervision received
    - Period of exposure
  4. Workplace evidence validation:
    - Currency of evidence
    - Authenticity of evidence
    - Sufficiency of evidence
  5. Workplace evidence reporting review:
    - Contribution towards progressive development for the qualification
    - Competency standard unit progressive reporting
    - Regular review of progress report
    - Timing of periodic monitoring/evaluation
    - Procedures for monitoring and analysing progress
    - Procedures for responding to anomalies in competency development
    - Procedures for liaison with the workplace supervisor
  6. Periodic evaluation of competency development (training) progress:
    - Stages of progress that are to be met in developing competent performance

- Evaluation of progress against requisite stages of development towards competent performance
- Implementation of remedial measures
- Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in refrigeration and air conditioning work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved

- E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

This unit shall be assessed concurrently with other units in a qualification.

UEENEEJ009A      Verify compliance and functionality of refrigeration and air conditioning installations

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## UEENEEC026A Participate in security equipment work and competency development activities

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed with core and nominated elective units in a qualification.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.</p> <p>Practice of this unit in the workplace is subject to State and Territory Security Industry regulations. Where the security system has a call-back-to-base facility practice in the workplace is also subject to ACA regulations to undertake cabling work.</p> <p style="margin-left: 40px;">Note: Units 'UEENEEF001A and UEENEEF002A provide the required skill and knowledge for registration in</p>						

accordance with ACA regulations for undertaking cabling work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with security equipment industry/enterprise work policies and procedures

- 1.1 Industry/enterprise policies and procedures for all work activities are obtained
- 1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person
- 1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

- 2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
- 2.2 All components of the competency development plan are followed diligently
- 2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued

- 2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
- 2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.
- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.
- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan.
- 2.2.46 Methods of monitoring and reporting competency development activities.
- 2.2.48 Enterprise work activities policies and procedures.

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes

required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
  - Timely reporting of workplace exposures and practice
  - Supervisor confirmation of workplace exposures and practices in a structured workplace report
3. Workplace evidence reporting:
  - Unit of work
  - Elements and performance of work
  - Range of items exposed to and practised on
  - Level of supervision received
  - Period of exposure
4. Workplace evidence validation:
  - Currency of evidence
  - Authenticity of evidence
  - Sufficiency of evidence
5. Workplace evidence reporting review:
  - Contribution towards progressive development for the qualification
  - Competency standard unit progressive reporting
  - Regular review of progress report

- Timing of periodic monitoring/evaluation
  - Procedures for monitoring and analysing progress
  - Procedures for responding to anomalies in competency development
  - Procedures for liaison with the workplace supervisor
6. Periodic evaluation of competency development (training) progress:
- Stages of progress that are to be met in developing competent performance
  - Evaluation of progress against requisite stages of development towards competent performance
  - Implementation of remedial measures
  - Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on

the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in security equipment work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and

support service policies and procedures provided by the RTO to all vocational and technical education activities

- D Seeking clarification of how particular work is to be carried out and the procedures involved
- E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and

following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 1.3;

## **UEENEEC027A Participate in rail communications and networks work and competency development activities**

### **Unit Descriptor**

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed with core and nominated elective units in a qualification.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as

confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with rail communications and networks industry/enterprise work policies and procedures

1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.

1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.

1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.

2.2 All components of the competency development plan are followed diligently.

2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.

2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.

2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.

2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.

2.7 Obligations are met for periodic and timely reporting of competency development activities.

- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan

- Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
    - Timely reporting of workplace exposures and practice
    - Supervisor confirmation of workplace exposures and practices in a structured workplace report
  3. Workplace evidence reporting:
    - Unit of work
    - Elements and performance of work
    - Range of items exposed to and practised on
    - Level of supervision received
    - Period of exposure
  4. Workplace evidence validation:
    - Currency of evidence
    - Authenticity of evidence
    - Sufficiency of evidence
  5. Workplace evidence reporting review:
    - Contribution towards progressive development for the qualification
    - Competency standard unit progressive reporting
    - Regular review of progress report
    - Timing of periodic monitoring/evaluation
    - Procedures for monitoring and analysing progress
    - Procedures for responding to anomalies in competency development
    - Procedures for liaison with the workplace supervisor
  6. Periodic evaluation of competency development (training) progress:
    - Stages of progress that are to be met in developing competent performance
    - Evaluation of progress against requisite stages of development towards competent performance
    - Implementation of remedial measures
    - Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in rail communications and networks work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved
    - E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person

- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop

and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**  
Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## UEENEEC028A Participate in hazardous areas work and competency development activities

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed with core and nominated elective units in a qualification.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.</p> <p>Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p> <p style="margin-left: 40px;">Note:</p> <p style="margin-left: 40px;">1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as</p>						

elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with hazardous areas industry/enterprise work policies and procedures

- 1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.
- 1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
- 1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

- 2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
- 2.2 All components of the competency development plan are followed diligently.
- 2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
- 2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
- 2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.
- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.

- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)
  - Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development

- (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
    - Timely reporting of workplace exposures and practice
    - Supervisor confirmation of workplace exposures and practices in a structured workplace report
  3. Workplace evidence reporting:
    - Unit of work
    - Elements and performance of work
    - Range of items exposed to and practised on
    - Level of supervision received
    - Period of exposure
  4. Workplace evidence validation:
    - Currency of evidence
    - Authenticity of evidence
    - Sufficiency of evidence
  5. Workplace evidence reporting review:
    - Contribution towards progressive development for the qualification
    - Competency standard unit progressive reporting
    - Regular review of progress report
    - Timing of periodic monitoring/evaluation
    - Procedures for monitoring and analysing progress
    - Procedures for responding to anomalies in competency development
    - Procedures for liaison with the workplace supervisor
  6. Periodic evaluation of competency development (training) progress:
    - Stages of progress that are to be met in developing competent performance
    - Evaluation of progress against requisite stages of development towards competent performance
    - Implementation of remedial measures
    - Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in hazardous areas work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved
    - E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
    - F Reporting periodically the competency development

activities in accordance with requirements

- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;

## **UEENEEC029A Participate in explosion-protected equipment overhaul work and competency development activities**

### **Unit Descriptor**

1)

This unit covers the application of industry/enterprise policies in actively participating in work activities and in one's own competency development. It complies with established industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed with core and nominated elective units in a qualification.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulation for undertaking electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various

jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Commercial

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Comply with explosion-protected equipment overhaul industry/enterprise work policies and procedures

- 1.1 Industry/enterprise policies and procedures for all work activities are identified and obtained.
- 1.2 Clarification on how particular work is to be carried out and the procedures involved is sought from the immediate supervisor/appropriate person.
- 1.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.

2 Monitor and respond to a personal competency development plan.

- 2.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
- 2.2 All components of the competency development plan are followed diligently.
- 2.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
- 2.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
- 2.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.

- 2.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.
- 2.7 Obligations are met for periodic and timely reporting of competency development activities.
- 2.8 Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of the unit.

- 2.2.45 Responsibilities under a competency development plan
- 2.2.46 Methods of monitoring and reporting competency development activities
- 2.2.48 Enterprise work activities policies and procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated following the completion of a range of performance process activities that contribute to assisting in the evaluation of progress towards the development of competency. The unit applies to those engaged in employment-based programs covered by an approved contract of training under a relevant State/Territory training Act seeking to complete the qualification. Incorporated therein is the requirement for deploying an approved competency development (training) plan.

The Plan specifies the units which are to be attained to complete the qualification. This unit is a core requirement for the completion of the qualification. It encompasses the processes required to participate in the development of competence by an apprentice/learner in the industry and in particular the activities associated with performance in the workplace and in vocational and technical education. It includes but is not limited to recognising and participating in:

1. The competency development plan:
  - Context of the plan
  - State/Territory regulatory requirements (Acts/Regulations)

- Competency development (training) contracts
  - Competency development (nominal training) period
  - Purpose of competency development (training) plans
  - Process in developing competency development (training) plans
  - Parties involved in the competency development (training) plan
  - Responsibilities of Parties:
    - RTO responsibilities
    - Role of State Training Authority (STA)
    - Employer responsibilities
    - Employee/Learner responsibilities
  - Context of responsible parties:
    - Industry customs, work practices
    - Industry bodies – employer and employee representatives
    - Regulatory bodies, including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
    - Vocational and technical education system – AQF, credentials, AQTF
    - RTO training practices, requirements, administration, costs, and support services
2. Workplace practice and exposure:
    - Timely reporting of workplace exposures and practice
    - Supervisor confirmation of workplace exposures and practices in a structured workplace report
  3. Workplace evidence reporting:
    - Unit of work
    - Elements and performance of work
    - Range of items exposed to and practised on
    - Level of supervision received
    - Period of exposure
  4. Workplace evidence validation:
    - Currency of evidence
    - Authenticity of evidence
    - Sufficiency of evidence
  5. Workplace evidence reporting review:
    - Contribution towards progressive development for the qualification
    - Competency standard unit progressive reporting
    - Regular review of progress report
    - Timing of periodic monitoring/evaluation
    - Procedures for monitoring and analysing progress
    - Procedures for responding to anomalies in competency development
    - Procedures for liaison with the workplace supervisor
  6. Periodic evaluation of competency development (training) progress:
    - Stages of progress that are to be met in developing competent performance

- Evaluation of progress against requisite stages of development towards competent performance
- Implementation of remedial measures
- Periodic progress report formally confirmed to parties

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of the unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in explosion-protected equipment overhaul work and competency development activities as described in 7) including:
    - A Identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
    - B Identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
    - C Identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the RTO to all vocational and technical education activities
    - D Seeking clarification of how particular work is to be carried out and the procedures involved

- E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- F Reporting periodically the competency development activities in accordance with requirements
- G Periodically reviewing progress of the competency development activities in accordance with requirements
- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events according to requirements
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

Competency in this unit shall be assessed concurrently with the all core and nominated elective units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular Key Competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 2.3; 2.4; 2.7;	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.7;	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2;	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3;



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1D  
D – Computer Systems**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## **UEENEED001A Use basic computer applications relevant to a workplace**

### **Unit Descriptor**

1)

This unit covers the basic use of personal computers application relevant to a work function. It encompasses switching the computer on, applying user preferences, selecting basic applications, entering and retrieving information and printing files.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to use computer applications.</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.</p> <p>1.2 Established OHS risk control measures and procedures in relation to computer and keyboard use are followed.</p> <p>1.3 Information required for the use of the application is obtained from appropriate sources.</p> <p>1.4 Computer is started up and desktop icons are manipulated to access desired application, directories and files.</p> <p>1.5 On-screen instructions in relation to any anomaly such as a virus warning are followed.</p> <p>1.6 Help directory is used to resolve any straightforward start up or access issues or anomalies.</p>
<p>2 Use computer basic application.</p>	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Information is added, altered or deleted as needed in accordance with application user instructions.</p> <p>2.3 Routine checks are made to ensure accuracy of information in accordance with quality requirements.</p>
<p>3 Output information from an application.</p>	<p>3.1 Completed files are stored appropriately in accordance with enterprise requirements.</p> <p>3.2 Files are printed for a formal record and/or to forwarded to others.</p> <p>3.3 Files are sent via email in a readable format.</p>
<p>4 Shut down computer.</p>	<p>4.1 Files are named, arranged, saved and backed up in accordance with enterprise requirements.</p> <p>4.2 Computer shutdown procedures are followed and computer switched off.</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices using basic computer applications relevant to a workplace.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.20 Computer use basics

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall/may be demonstrated in relation to at least three of the following using computer applications to produce, store and forward engineering related reports and/or results at a basic level.

- Word processing
- Spread sheet
- Drawings
- Business management
- Apparatus set-up
- Note:  
Apparatus set-up applications are invariably vendor specific and include icon-based integration and control applications.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range

statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Use basic computer applications relevant to workplace as described in 7) and including:
    - A Correctly starting-up a computer.
    - B Dealing with anomalies appropriately.
    - C Following application instructions to input and output information.
    - D Storing information appropriately.
    - E Outputting information to a printer.
    - F Forwarding information via email and/or web mail in a readable format.
    - G Producing, storing and forwarding engineering related reports and/or results using at least three computer applications according to requirements
    - H Shutting down a computer correctly
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency to produce, store and forward engineering related reports and/or results using a range of computer applications.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.4; 2.3; 3.2; 3.3	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.3; 3.2; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEED002A Assemble, set up and test personal computers

### Unit Descriptor

1)

This unit covers assembly, setting up and testing personal computers as directed in computer service manuals. It encompasses safe working practices, checking computer components, assembling components to form a basic personal computer, installing and testing basic operating system, drivers and application software, following written and oral instruction and applying customer relations procedures.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE007A Use drawings, diagrams, schedules and manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment formally-acquired competencies.

**Licence to practise**

**3.1)**

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking electrical work. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field**

**4)**

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Assemble personal computer.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures in relation to computer and keyboard use are followed.
- 1.3 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.4 Computer, components, operating system and application software are obtained in accordance with established routines and checked as meeting requirements.
- 1.5 Computer components are assembled and connected in accordance with manufacturer instructions.
- 1.6 Routine quality checks are carried out in accordance with work instructions.
- 1.7 Procedures are followed for referring non-routine events to immediate supervisor for directions.

2 Install operating system and application software.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Computer is started up and on-screen instructions for the installation of the operating system to default configuration are followed, including drivers.
- 2.3 Application software is installed to default configuration following on-screen installation instruction.

- |   |     |   |
|---|-----|---|
|   | 2.4 | Computer shutdown procedures are followed and computer switched off.  |
|   | 2.5 | Routine quality checks are carried out in accordance with work instructions.  |
|   | 2.6 | Procedures for referring non-routine events to immediate supervisor for directions are followed.  |
| 3 | 3.1 | Test computer operation.<br>Established OHS risk control measures and procedures for carrying out the work are followed.  |
|   | 3.2 | Computer is switched on and start-up procedures are followed and checked.   |
|   | 3.3 | Operating system and application programs are checked to be opening and operating correctly.  |
|   | 3.4 | Faults are identified as being the result of faulty hardware or software.   |
|   | 3.5 | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.                  |
|   | 3.6 | Faults are rectified in accordance with computer hardware, operating system and application instructions.   |
|   | 3.7 | Procedures for referring non-routine events to immediate supervisor for directions are followed.  |
|   | 3.8 | Computer shutdown procedures are followed and computer switched off.  |
|   | 3.9 | Work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles. |
| 4 | 4.1 | Complete work and report.<br>OHS risk control work completion measures and procedures are followed.   |
|   | 4.2 | Work area is cleaned and made safe in accordance with established procedures.   |
|   | 4.3 | Work supervisor is notified of the completion of the work in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices, assembling, setting-up and testing personal computers.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.11 Personal computers, hardware structure
- 2.4.12.1 Computer hardware sub-assemblies
- 2.4.14 Personal computer operating systems, basics
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to assembling, setting-up, test and rectifying faults in a personal computer for single user operation and not intended to be connected to a network. Hardware faults rectification is confined to replacement of subassemblies and interconnections. Software faults rectification is confined to resetting default configuration.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in

some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble, set up and test personal computers as described in 7) and including:
    - A Correctly connecting computer, components and peripherals.
    - B Installing a basic operating system for single user operation.
    - C Installing application software to default configuration.
    - D Testing computer operation.
    - E Identifying and rectifying interconnection faults.
    - F Shutting down a computer correctly.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling, setting up and testing personal computers.

### **Method of assessment**

#### **8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

### Concurrent assessment and relationship with other units

#### 8.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE002A	Dismantle, assemble and fabricate electrotechnology components
UEENEEE007A	Use drawings, diagrams, schedules and manuals

### Key competencies

#### 8.6)

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.2; 3.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills	Refer to the following Performance Criteria for examples of application:	

applied?	3.4 to 3.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.2 to 3.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.5; 2.2 to 2.4; 3.2 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6; 3.7

## UEENEED003A Evaluate and modify programs written in object oriented code

### Unit Descriptor

1)

This unit covers evaluating and modifying programs based on object-oriented code. It encompasses safe working practices, following written and oral instruction and procedures, applying knowledge of object-oriented code scripting and testing and documenting outcomes.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED001A Use basic computer applications relevant to a workplace

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to evaluate and modify programs written in object oriented code.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of program modification work is determined from job performance specifications and in consultation with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Appropriate development kit and software are selected based on specified requirements and performance standard.</p> <p>1.6 Strategies are implemented to ensure programming is carried out efficiently.</p>
<p>2 Evaluate and modify programs written in object oriented code.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of computer function features are applied to object oriented programming.</p> <p>2.3 Correct syntax is applied to evaluating and modifying.</p> <p>2.4 Key features of the an object orientated programming language are applied to evaluation and modification. (See Note)</p> <p>2.5 Approaches to issues/problems are analysed to provide most effective solutions.</p> <p>2.6 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.</p>
<p>3 Test and document modified programs written in object oriented code.</p>	<p>3.1 Procedures are developed to test modified programming.</p> <p>3.2 Problems and bugs in code are rectified to ensure specification in the creation of the code is met.</p> <p>3.3 Intermediate and final work reports are written in accordance with professional standards, and presented to appropriate person(s).</p>

Note.

Key features include object; class; instance; member data/fields; member attributes/methods and local variables.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and evaluating and modifying programs written in object oriented code.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.43.1 Object oriented programming basics

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any object oriented programming language including the following features.

- Graphical User Interfaces
- Applets and graphics
- Exceptions

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Evaluate and modify programs written in object oriented code as described in 7) and including:
    - A Using key features of object oriented programming to evaluate and modify program.
    - B Modifying three programs' features.
    - C Developing testing procedures.
    - D Identifying problem and bugs in code.
    - E Rectifying problem and bugs in code.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in evaluating and modifying programs written in object oriented code.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

The critical aspects of Occupational Health and Safety covered in UEENEEE001A and other discipline specific Occupational Health and Safety units shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.1	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:	

	2.1 to 3.2	3
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2 to 2.6; 3.1
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.1; 3.2

## UEENEED004A Use engineering applications software

### Unit Descriptor

1)

This unit covers the use of computers application relevant to engineering support work functions. It encompasses installing software, applying user preferences, using application menus and tools, entering and retrieve information, working with groups and transferring and printing files.

Note:

Examples of engineering application software are Visio, Electronic Work Bench, LabView

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

### ELEMENT

5) Elements describe the essential outcomes of a unit of competency

### PERFORMANCE CRITERIA

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

- |   |   |     |   |
|---|---|-----|---|
| 1 | Prepare to use computer applications.   | 1.1 | OHS procedures for a given work area are identified, obtained and understood through established routines and procedures. |
|   |   | 1.2 | Established OHS risk control measures and procedures in relation to computer and keyboard use are followed.               |
|   |   | 1.3 | Application software and information required for its installation and use is obtained from appropriate sources.          |
|   |   | 1.4 | Application software is installed to default configuration following on-screen installation instruction.                  |
|   |   | 1.5 | On-screen instructions in relation to any anomaly such as a virus warning are followed.                                   |
|   |   | 1.6 | Help directory is used to resolve any straightforward start up or access issues or anomalies.                             |
| 2 | Use engineering application software.   | 2.1 | Established OHS risk control measures and procedures for carrying out the work are followed.                              |
|   |   | 2.2 | Techniques that apply to a particular software package are used to produce appropriate files.                             |
|   |   | 2.3 | Routine checks are made to ensure accuracy of information in accordance with quality requirements.                        |
| 3 | Output information from an application. | 3.1 | Completed files are stored appropriately in accordance with enterprise requirements.                                      |
|   |   | 3.2 | Files are printed for formal records and/or to forwarded to others.   |
|   |   | 3.3 | Files are sent via email in a readable format.  |
| 4 | Shut down computer.                     | 4.1 | Files are named, arranged, saved and backed up in accordance with enterprise requirements.                                |
|   |   | 4.2 | Computer shutdown procedures are followed and computer switched off.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices using engineering application software.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.16 Personal computers, engineering applications software basic

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to using at least two of the following types of engineering applications at a basic level.

- Apparatus set up and calibration
- Computer Aided Design
- Engineering data analysis software
- Engineering modelling
- Project management
- Note:
- Apparatus set-up applications are invariably vendor specific and include icon-based integration and control applications.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range

statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Use engineering applications software as described in 7) and including:
      - A Correctly installing software.
      - B Dealing with anomalies appropriately.
      - C Following application instructions to input and output information.
      - D Storing information appropriately.
      - E Outputting information to a printer.
      - F Forwarding information via email in a readable format.
      - G Saving, storing and backing up files for effective retrieval by others.
      - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment

environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in using engineering application software.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3; 3.1	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  1.5 to 1.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1 to 1.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.5 to 1.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.5
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## **UEENEED005A Enter and verify operating instructions in microprocessor equipped devices**

### **Unit Descriptor**

1)

This unit covers entering instructions in microprocessor-equipped devices (embedded system) with simple built-in programming function and verifying that the device operates as intended. It encompasses safe working practices, checking device installation, following written and oral instruction and procedures and completing necessary documentation.

Note:

Examples of devices are simple programmable relays, timers, temperature controllers, switches and basic detection devices for security and fire the like.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field****4)**

Computer Systems

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to enter operating instructions.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards that have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.</p> <p>1.4 Work supervisor or customers are consulted to determine which functions of the device are to be used and the parameter of each</p> <p>1.5 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p> <p>1.6 Device installation is checked for compliance with job specification and regulations where they apply.</p>
2 Enter operating instructions.	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.3 The required status of each function of the device is entered and their parameters set in accordance with manufacturer programming instructions.</p> <p>2.4 Entered data are checked as meeting those specified by the work supervisor or customer.</p> <p>2.5 Procedures for referring non-routine events to immediate supervisor for directions are followed.</p> <p>2.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
3 Test device operation and report.	3.1 Device operation is tested in strict accordance OHS requirements and procedures.

- 3.2 Operating anomalies are identified and corrected in accordance with established routines.
- 3.3 OHS work completion risk control measures and procedures are followed.
- 3.4 Work site is cleaned and made safe in accordance with established procedures.
- 3.5 Work completion is reported and appropriate person(s) notified in accordance with established routines.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and entering and verifying operating instruction in basic microprocessor equipped devices.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.3.7 Smart device basics
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to entering and verifying operating instruction in at least two types of microprocessor equipped devices with built-in icon-based programmable functions such as programmable relays, timers, temperature controllers, detection devices for security and fire .

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Enter and verify operating instructions in microprocessor equipped devices as described in 7) and including:
    - A Understanding required operating functions and parameters.
    - B Identifying non-compliance conditions of device installation.
    - C Entering functions and parameters correctly.
    - D Correcting programming anomalies.
    - E Testing and verify device operation.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of

outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in enter and verifying operating instructions in microprocessor equipped devices.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies 8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 3.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.2	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.5; 3.2; 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## **UEENEED007A    Develop, enter and verify programs for programmable logic controllers using ladder instruction set**

### **Unit Descriptor**

1)

This unit covers development, installation and testing of programs for programmable logic controllers (PLC) for a system requiring extended control functions. It encompasses working safely, applying knowledge of control systems, control system development methods, ladder logic control functions, using ladder instruction set, following written instructions and documenting program development and testing activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be only after all relevant competency standard units at AQF level 3 have been achieved.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended to augment formally-acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus, site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field**

4)

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Prepare to develop enter and verify program.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.
- 1.4 Control system scenario is determined from job specifications of the process/plant/machine to be controlled, and through consultation with appropriate person(s).
- 1.5 Equipment, software and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
- 1.6 Installation of programmable controller is checked for compliance with regulations and job specification.

2 Develop control system and enter and test program.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.3 Control solutions are developed and documented based on the specified control mode and using acceptable methods for designing control systems.
- 2.4 Developed control system is converted to an appropriate form, such as flow, state and ladder diagrams, using a personal computer and software applicable to the programmable controller into which the program is to be entered. (See Note 1)
- 2.5 Program is entered into the programmable control using a personal computer and appropriate software.

- |   |   |  |
|---|---|--|
|   | 2.6   | Entered instructions and settings are tested as meeting those specified in by the control system scenario.                                   |
|   | 2.7   | Appropriate methods and tools are used to test control systems and operating faults and anomalies are identified and rectified. (See Note 2) |
|   | 2.8   | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.                              |
| 3 | Verify, document and report programming activities. | 3.1 OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2 Program is transferred from a programmable controller to an external medium for storage. (See Note 3)                                    |
|   |   | 3.3 Control system specification and program are documented in accordance with established procedures.                                       |
|   |   | 3.4 Work completion is reported and appropriate personnel notified in accordance with established procedures.                                |

Note.

1. Example of control functions are derived timers (off delay, self resetting, constant duty cycle), reversible counters, cascading timers, cascading counters, combining timers and counters, internal relays/flags/markers, latching relays (set/reset), jump instructions, master control instructions, bit shift registers, scan time considerations, one shot, retentive (power fail) functions, simple step sequence instructions

2. Examples of control system testing methods and tools are monitor mode as an aid to fault finding, inbuilt hardware/software diagnostics and use of error codes.

3. Examples of storage mediums are IC storage, hard disks, servers .

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing, entering and verifying programs for programmable logic controllers using ladder instruction set. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.3.8    | Programmable controller basics                                       |
| 2.3.9    | PLC programming basics   |
| 2.3.10.1 | PLC programming  |
| 2.7.13   | Electrical installations, programmable logic controller requirements |
| 2.18.1   | Occupational Health and Safety principles                            |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing, entering and verifying programs for programmable logic controllers. The program shall include at least five of the following functions/controls:

- Derived timers (off delay)
- Self resetting
- Constant duty cycle)
- Reversible counters
- Cascading timers
- Cascading counters
- Combining timers and counters
- Internal relays/flags/markers
- Latching relays (set/reset)
- Jump instructions
- Master control instructions
- Bit shift registers
- Scan time considerations
- One shot
- Retentive (power fail) functions
- Simple step sequence instructions

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to

include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop, enter and verify programs for programmable logic controllers using ladder instruction set as described in 7) and including:
    - A Developing a control system solution to the required operating functions and parameters.
    - B Identifying non-compliance conditions of device installation.
    - C Converting control system to a PLC program.
    - D Entering programming functions and parameters correctly.
    - E Transferring programs to a PLC.
    - F Correcting programming anomalies.
    - G Testing and verify control system operation.
    - H Transferring program to external storage.
    - I Documenting control system and programming clearly.
    - J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing, entering and verifying programs for programmable logic controllers using ladder instrument set.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this	Refer to the following Performance Criteria for examples of application:	

competency?	1.4; 3.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2; 3.3	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2; 3.3
5	Planning and organising the	Refer to the following Performance Criteria for examples of application:

	meaningful work task	1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4

## **UEENEED008A    Develop, enter and verify programs in Supervisory Control and Data Acquisition systems**

### **Unit Descriptor**

1)

This unit covers development, installation and testing of programs for supervisory control and data acquisition. It encompasses working safely, process analysis, developing process condition database, developing Human-Machine Interface (HMI), using dedicated SCADA software package and documenting programming activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED009A    Develop, enter and verify programs for industrial control systems using high level instructions.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended to augment formally recognised competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus, site rehabilitation.
2. Compliance may be required in various jurisdictions relating to

currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field**

4)

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Prepare to develop programs for supervisory control and data acquisition systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the SCADA system is determined from design brief and process specifications.
- 1.4 Process data are analysed for development of graphical design/mimic diagrams.
- 1.5 PLC analogue and digitised addresses are related to tag database.
- 1.6 Tag data types are configured in the database.
- 1.7 Graphic objects are created and added to a graphic library. (See Note 1)
- 1.8 Equipment, software and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Develop and enter programs using dedicated supervisory control and data acquisition software.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 SCADA software is used to develop human-machine interface (HMI) of processes.
- 2.3 Control functions, data acquisition components and automated tasks are programmed using SCADA software.
- 2.4 Complex data is manipulated within the SCADA software.
- 2.5 Alarms and limits for process variables are identified and programmed accordingly.
- 2.6 Trends for process variables and limits are programmed accordingly.

		2.7	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
3	Monitor, verify and document programming activities.	3.1	Device operation is tested in strict accordance OHS requirements and procedures.
		3.2	Entered objects and settings are tested as meeting those specified in the design brief.
		3.3	SCADA software tools are used to test and monitor programs and operating faults, anomalies are identified and rectified.
		3.4	OHS work completion risk control measures and procedures are followed.
		3.5	SCADA system specification and program are documented in accordance with established procedures.
		3.6	Work completion is reported and appropriate personnel notified in accordance with established procedures.

Note.

1. Graphic libraries are typically part of vender software for SCADA systems.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing, entering and verifying programs in Supervisory Control and Data Acquisition systems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.3.14 Supervisory control and data acquisition systems programming

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing entering and verifying programs in Supervisory Control and Data Acquisition systems. The program shall include the following programming activities:

- Configuring tag type data
- Creating at least five graphic objects
- Adding graphic objects to the graphic library

- Developing a HMI for a given system
- Incorporating alarms and limits for process variables
- Incorporating trends for process variables and limits.
- Entering objects and testing
- Rectifying operating faults and anomalies

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Developing, entering and verifying programs in Supervisory Control and Data Acquisition systems as described in 7) and including:
    - A Collecting and analysing data accurately.
    - B Converting data to an appropriate database.
    - C Creating appropriate graphic object and adding them to a graphic object library.
    - D Developing effective HMI.
    - E Programming SCADA functions and data acquisition components correctly.
    - F Manipulating complex data effectively.

- G Correcting programming faults and anomalies.
- H Documenting SCADA system and programming clearly.
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in develop, enter and verify programs in Supervisory Control and Data Acquisition systems.

### **Method of assessment**

#### **8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

### **Concurrent assessment and relationship with other units**

#### **8.5)**

There are no concurrent assessment recommendations for this unit.

### **Key competencies**

#### **8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2; 3.3	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.3; 3.2; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEED009A    Develop, enter and verify programs for industrial control systems using high level instructions**

### **Unit Descriptor**

1)

This unit covers development, installation and testing of programs for an industrial system requiring advance control functions. It encompasses working safely, using structure logic, acceptable design techniques, applying knowledge of high level instructions, and documenting development and programming activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED007A    Develop, enter and verify programs for programmable logic controllers using ladder instruction set.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended to augment formally-acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus, site rehabilitation.
2. Compliance may be required in various jurisdictions relating to

currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field**

4)

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Prepare to develop industrial control systems programs.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Mode of operation of the control system is determined from job specifications of the process/plant/machine to be controlled, and through consultation with appropriate person(s).
- 1.4 Equipment, software and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
- 1.5 Installation of programmable controller is checked for compliance with regulations and job specification.

2 Develop and enter and programs for industrial control systems.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Control solutions are developed and documented based on the operational mode and using acceptable methods for designing control system that contain numeric variables and values.
- 2.3 Developed control system is converted to an appropriate form, such as flow, state and ladder diagrams, using a personal computer and software applicable to the programmable controller into which the program is to be entered.
- 2.4 Programming elements are written and used to manipulate word data. (See Note 1)
- 2.5 Program control values are assigned using an applicable numbering system and code. (See Note 2)
- 2.6 Programs are written to read and write analog signals offset using applicable software tools.

	2.7	Arithmetic functions are used to scale analog inputs to a specified span.	
	2.8	Program is entered into the programmable control using a personal computer and appropriate software.	
	2.9	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.	
3	Monitor, verify and document programming activities.	3.1	Device operation is tested in strict accordance OHS requirements and procedures.
		3.2	Entered instructions and settings are tested as meeting those specified for the control mode requirements.
		3.3	Appropriate methods and tools are used to test and monitor control programs and operating faults, anomalies are identified and rectified. (See Note 3)
		3.4	OHS work completion risk control measures and procedures are followed.
		3.5	Control system specification and program are documented in accordance with established procedures.

Notes.

1. Example of programming elements are loading data from discrete input switches to an internal register; manipulating internal registers using arithmetic, logical and other functions; driving outputs from internal registers; utilizing thumbwheel switches and displays; manipulating double registers with mathematical operations; loading constants, variables and presets in and out of memory; using masking of registers to obtain desired data; using tables for the storage of data.
2. Examples are binary and signed binary, numbering systems and codes such as BCD or ASCII codes
3. Examples of control program testing and monitoring methods and tools are locating status bits (flags); examining and modifying watchdog timer; investigating the implications of rung positioning in relation to scan.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing, entering and verifying programs for industrial control systems using high level instructions.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.3.10.2 PLC high level programming

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing, entering and verifying programs for industrial control systems using high level instructions. The program shall include at least five of the following functions/controls:

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Developing, entering and verifying programs for industrial control systems using high level instructions as described in 7) and including:
    - A Developing a control system to the required operating functions and parameters.
    - B Identifying non-compliance conditions of device installation.
    - C Converting control system to a PLC program.
    - D Entering programming functions and parameters correctly.
    - E Correcting programming anomalies.
    - F Testing and verify device operation..
    - G Documenting control system and programming clearly.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing, entering and verifying programs for industrial control systems using high level instructions.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2; 3.3	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.3; 3.2; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9

## **UEENEED010A Set up and create content for a web server**

### **Unit Descriptor**

1)

This unit covers installation, set up, implementation and provision of on-going support of web services. It encompasses working safely, installing and administering server software and databases, server side scripting, configuring access and security and documenting work activities.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

### **ELEMENT**

### **PERFORMANCE CRITERIA**

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to develop and implement web based server.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of development work is determined from server performance specifications and in consultation with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Appropriate development tools and software are selected based on specified requirements and performance standards.</p> <p>1.6 Strategies are implemented to ensure development work is carried out efficiently.</p>
<p>2 Develop web services.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Server software is installed and configured to ensure effective functionality and security. (See Note 1)</p> <p>2.3 Knowledge of syntax functions and features of mark-up languages scripts in current use are applied to developing client-side programming. (See Notes 2 and 3)</p> <p>2.4 Pages are created and rendered with relative and absolute links, images and table formatting using cascaded styles sheets.</p> <p>2.5 Forms are created with a variety of appropriate elements and element groupings to make forms easy to follow.</p> <p>2.6 Knowledge of server scripting languages in current use is applied to scripting to developing client-side programming and validations. (See Note 4)</p> <p>2.7 Scripts are written to provide web functionality and management of relation databases. (See Notes 5 and 6)</p> <p>2.8 Scripts are written to provide web functionality and management of browser windows, security, web application deployment and administration consoles.</p> <p>2.9 A number of individual solutions are integrated to meet the specifications of a web application project.</p>

- |   |      |  |
|---|------|--|
|   | 2.10 | Approaches to issues/problems are analysed to provide most effective solutions.  |
|   | 2.11 | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.           |
| 3 | 3.1  | Testing and procedures are developed to evaluate client-side programming and web applications and services.                                |
|   | 3.2  | Problems and bugs in client-side programming, and web services functionality are identified and rectified to ensure specification are met. |
|   | 3.3  | Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person(s).          |

Notes.

1. Examples of web software are Apache, IIS .
- 2.Examples of mark-up languages are HTML, XML and XSL.
- 3.Example of scripts are Javascript and VB script.
4. Examples of server scripting languages are JSP, ASP, PHP and Perl
5. Examples of relational databases are SQL variants and Access
6. Examples of database connectivity components are ODBC, JDBC and ADO

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and setting up and creating content for a web server.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.4.20 | Programming elements                      |
| 2.4.21 | Client-side programming                   |
| 2.4.22 | Server scripting                          |
| 2.4.23 | Database access                           |
| 2.4.24 | Web application server and services       |
| 2.18.1 | Occupational Health and Safety principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to web and application servers and web services technology within a multi-tier client-server environment. This shall include:

- Development, implementation and testing HTML pages with at least four of the following features:
  - Relative and absolute links, images and table formatting
  - Cascaded styles sheets
  - Forms
  - New browser windows
  - Validation of form data
- Development, implementation and testing of server scripting for database access with at least four of the following features:
  - Form data input response
  - Form data processing
  - Database access
  - Output of database table contents
  - Insertion of table data to database
- Installation and administration of key features of Web and Web application servers

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most

effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up and create content for a web server as described in 7) and including:

- A Interpreting server performance requirements.
- B Identifying the appropriate development tools and software.
- C Installing and configure web server software.
- D Creating and rendering effective web pages.
- E Providing web functionality and management of relation databases.
- F Providing web functionality and management of browser windows, security, web application deployment and administration consoles.
- G Developing testing procedures.
- H Identifying problem and bugs in client-side programming and web services functionality.
- I Rectifying problem and bugs.
- J Writing intermediate and final work reports to the required standard.
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in set up and create content in a web server.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the

Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.1	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.1; 3.2	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.10	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.9; 3.1; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:	

	2.1 to 3.2	3
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2 to 2.11; 3.1
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10; 3.2

## **UEENEED011A      Create object oriented code**

### **Unit Descriptor**

**1)**

This unit covers developing, implementing and testing object oriented programming solutions using object orientated programming language. It encompasses following development brief, using appropriate development software, writing code that features classes, inheritance, arrays and packages, creating applets and documenting development activities.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED003A    Evaluate and modify programs written in object oriented code

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field**

4)

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Prepare to create object oriented code.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of code creation work is determined from job performance specifications and in consultation with relevant persons.
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Appropriate development kit and software are selected based on specified requirements and performance standard.
- 1.6 Strategies are implemented to ensure programming is carried out efficiently.

2 Create code.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of computer function features are applied to object oriented programming.
- 2.3 Correct syntax is applied to creating code.
- 2.4 Key features of the an object orientated programming language are applied to develop and test solutions.  
 Note:  
 Key features include object; class; instance; member data/fields; member attributes/methods and local variables.
- 2.5 Code is written that features data encapsulation, composition, inheritance and packages.  
 Note:  
 Examples of packages are java.lang, java.awt and java.io
- 2.6 Code is written that invokes overridden or overloaded methods and parental or overloaded constructors.
- 2.7 Approaches to issues/problems are analysed to provide most effective solutions.

	2.8	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.	
3	Test and document the creation of object oriented code.	3.1	Testing procedures are developed to analyse code developed in Objected Oriented Programming. Language.
		3.2	Problems and bugs in code are rectified to ensure specification in the creation of the code is met.
		3.3	Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and creating object oriented code.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.43.2 Object orientated programming

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any object oriented programming language including the following features.

- Graphical User Interfaces
- Applets and graphics
- Exceptions
- Streams, files and Stream output
- Utility Classes
- Threads

Note:

Example of programming referred to here is Java

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## **Critical aspects of evidence required to demonstrate competency in this**

### **8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Create object oriented code as described in 7) and including:
    - A Using all key features of object oriented programming.
    - B Developing testing procedures.
    - C Identifying problem and bugs in code.
    - D Rectifying problem and bugs in code.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**
**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in creating object oriented code..

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.1	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this	Refer to the following Performance Criteria for examples of application:	

competency?	1.4; 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.7	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.2	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 2.2 to 2.7; 3.1
5	Planning and organising the	Refer to the following Performance Criteria for examples of application:

	meaningful work task	1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 3.2

# UEENEED012A Support computers hardware and software

## Unit Descriptor

1)

This unit covers upgrading and maintaining computers, computer devices and peripherals and installing, maintaining and configuring software. It encompasses safe working practices, installing and testing the upgrading components, locating faults in hardware components, replacing faulty components, installing and testing the operating system and application software, testing functionality, rectifying malfunctions, following written and oral instruction and procedures and applying appropriate customer relations.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED002A Assemble, set-up and test personal computers

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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## Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

## Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

## Competency Field

4)

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Prepare to upgrade and maintain computer hardware and software.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Appropriate person(s) are consulted to determine the nature of computer or peripheral hardware/software upgrading or maintenance.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others affected by the work.
- 1.5 Hardware components needed to upgrade or maintain computers and peripherals are obtained in accordance with established procedures and checked against job requirements. (See Note 1)
- 1.6 Software version updates needed upgrade or maintain computers are obtained in accordance with established procedures and checked against job requirements. (See Note 2)

2 Upgrade computer hardware and software.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Computers are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.3 Computers and peripherals are dismantled as needed for upgrading in accordance with service manual instructions or industry practices, and parts stored to prevent loss or damage.
- 2.4 Upgrading components are fitted and computer/peripheral apparatus is reassembled in accordance with service manual instructions or industry practices.
- 2.5 Upgrading software components are installed and accordance with service manual instructions or industry practices.
- 2.6 Operating system, including device drivers and application software are tested in preparation for return to service/customer. (See Note 3)

- |   |   |  |
|---|---|--|
|   | 2.7   | Computer/peripheral apparatus is tested and prepared for return to customer.   |
| 3 | Maintain operation of computer hardware and software. | 3.1 OHS risk control measures and procedures for carrying out the work are followed.   |
|   | 3.2   | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.                                     |
|   | 3.3   | Computers are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |
|   | 3.4   | Computers and peripherals are dismantled as needed to find and rectify faults in accordance with service manual instructions and industry practices, and parts stored to prevent loss or damage. |
|   | 3.5   | Faults are identified using logical techniques drawing on knowledge of computer/peripheral hardware components and measured values of operating parameters.                                      |
|   | 3.6   | Faulty components are rechecked and their fault status confirmed.  |
|   | 3.7   | Operating system malfunctions are identified using logical techniques drawing on knowledge of operating system configuration requirements.   |
|   | 3.8   | Device driver malfunctions are identified using logical techniques drawing on knowledge of device driver software configuration requirements.  |
|   | 3.9   | Application software malfunctions are identified using logical techniques drawing on knowledge of software configuration requirements.   |
|   | 3.10  | Malfunctions are rectified using latest software versions, incremental updates and bug and security patches.   |
|   | 3.11  | Computer hardware/peripheral device, operating system, including device drivers, and application software are tested in preparation for return to service/customer.                              |
|   | 3.12  | Redundant files are removed and disposed of or archived in accordance with established procedures.   |
|   | 3.13  | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |

- |   |      |   |
|---|------|---|
|   | 3.14 | Maintenance is carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or other services. |
| 4 Complete and report upgrading and maintenance activities. | 4.1  | OHS work completion risk control measures and procedures are followed.  |
|   | 4.2  | Work area is cleaned and made safe in accordance with established procedures.   |
|   | 4.3  | Written justification is produced for hardware software upgrading and maintenance.  |
|   | 4.4  | Upgrading and maintenance is documented and appropriate person(s) notified in accordance with established procedures.                               |

Note:

1. Example of materials are motherboards, processors and memory modules.
2. Example include complete version update, incremental (download) updates and security and bug patches.
3. Examples include Internet access, word processing, spreadsheet, graphics, publishing and industrial applications.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and supporting computers hardware and software.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.4.3.2 | Networking fundamentals                   |
| 2.4.13  | Computer peripherals                      |
| 2.4.15  | Computer operating systems                |
| 2.18.1  | Occupational Health and Safety principles |
| 2.18.9  | Electronic Safe working practices         |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to maintaining and upgrading the operating system, including device drivers and at least three application software types for a personal computer and server.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Support computers hardware and software as described in 7) and including:
    - Upgrade a computer and two external peripheral devices including:
      - A Obtaining appropriate upgrading components
      - B Dismantling, fitting upgrading components and reassembling correctly
      - C Testing upgrade
      - D Documenting upgrading activities
    - Upgrade computer software on at least two occasions including:
      - E Identifying upgrade needs
      - F Installing upgrade components
      - G Testing upgraded software
      - H Documenting upgrade activities

- Maintain a computer and two external peripheral devices including:
  - I Testing and identifying faulty components
  - J Dismantling, fitting replacement components and reassembling correctly
  - K Testing maintenance repair
  - L Documenting maintenance activities
- Maintain computer software on at least two occasions including:
  - M Identifying operating system malfunctions
  - N Identifying device driver malfunctions
  - O Identifying application malfunctions
  - P Rectifying software malfunctions
  - Q Dealing with redundant files and backups
  - R Documenting maintenance activities
  - S Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in support computers hardware and

software.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3; 4.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 1.6; 2.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.4; 3.5; 3.9; 3.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.7; 3.2 to 3.12	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.4; 4.3; 4.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.2 to 2.9; 3.2 to 3.12
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 3.13

## UEENEED013A **Install and administer Unix based computers**

### Unit Descriptor

1)

This unit covers the installation and administration of UNIX based and networked computers. It encompasses safe working practices, performing basic UNIX, Linux or Mac OSX operating system installation, administration functions of logging in and out, setting up GUI applications, manipulating text files, creating and searching files and directories, changing permissions, using text editors, identifying and modifying initialization files, streamlining command, execution using shell features, using basic network commands and documenting all administration activities.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to install, upgrade and maintain network operations.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The nature of the administration work is established from network specifications and in consultation with appropriate person(s).</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Unix system variants, versions and updates needed to maintain the computers and networks are identified and obtained in accordance with established procedures and checked against job requirements.</p>
2 Install, upgrade and maintain Unix-based computers and network operations	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Unix operating system is installed upgraded and configured on computers and servers in accordance with developer’s instructions and network requirements.</p> <p>2.3 Devices and drivers, desktop environment, network protocols and services and system security are implemented in accordance with requirements.</p> <p>2.4 Access to resources is configured within the limitations specified for each users.</p> <p>2.5 Unix-based network malfunctions are identified and rectified using logical techniques and drawing knowledge of devices and drivers, storage, basic network protocols, connections and services and system security configuration processes.</p> <p>2.6 Network performance and reliability is monitored and optimised in accordance with established procedures.</p> <p>2.7 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p>

- |   |   |   |   |
|---|---|---|---|
|   | 2.8   | Unix-based network administration is carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or other services. |   |
| 3 | Document network administration activities. | 3.1   | Written justification is produced for network upgrading and maintenance and appropriate person(s) notified in accordance with established procedures. |
|   |   | 3.2   | Network administration documentation are maintained in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing, configuring and administering Unix based computers.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.15 Computer operating systems

2.4.27.1 Unix fundamentals

2.18.1 Occupational Health and Safety principles

OR

2.4.15 Computer operating systems

2.4.27.2 Linux fundamentals

2.18.1 Occupational Health and Safety principles

OR

2.4.15 Computer operating systems

2.4.27.1 MacOSX fundamentals

2.18.1 Occupational Health and Safety principles

Note.

Essential knowledge and associated skill shall be relevant to the operating system for which competency is sought.

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing and configuring the operating system and administering at least two networked computers using at least one of UNIX, Linux or MacOSX operating systems

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to

consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and administer Unix based computers as described in 7) and including:
    - A Identify the Unix-based operating system variants, versions and updates required.
    - B Installing, upgrading and configuring computer operating system correctly.
    - C Configuring access to resources for each user.
    - D Identifying computer/network malfunctions.
    - E Rectifying computer/network malfunctions.
    - F Documenting computer/network administration activities.

- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and administering Unix based computers.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.1; 3.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3; 1.5; 2.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  1.5; 2.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:

		All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.4; 3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.2 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.7

## **UEENEED014A Design and manage enterprise networks**

### **Unit Descriptor**

1)

This unit covers designing, managing, monitoring and diagnosing enterprise servers. It encompasses safe working practices, designing and managing Domain Name Server (DNS), Email servers, Dynamic Host Configuration Protocol (DHCP), Remote access servers, Network Address Translation (N/AT), Directory services, Authentication Servers and documenting all designing and managing activities.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED016A Develop network services

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 6.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

### **ELEMENT**

### **PERFORMANCE CRITERIA**

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Develop design for an enterprise network.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 The extent of the network to be designed is determined from design brief and/or in consultation with appropriate persons.</p> <p>1.3 Business requirements of the enterprise are analysed taking into account existing and projected business model, organisational and Information Technology management structures.</p> <p>1.4 Consideration is given to factors that will have an impact on the design such as business priorities, growth, growth strategy, regulatory framework, risk, and cost.</p> <p>1.5 Existing and planned technical and environment goals of the enterprise are evaluated and documented. (See Note 1)</p> <p>1.6 Consideration is given to technical factors that will have an impact on the design. (See Note 2)</p> <p>1.7 Client access and end-user needs and usage patterns and disaster recovery requirements are evaluated and documented.</p> <p>1.8 Design specification is written using information obtained from the analysis and evaluations of enterprise business and technical requirements.</p> <p>1.9 Network specification is presented and discussed with person(s) of higher authority.</p> <p>1.10 Alterations to the network specification resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation’s policy.</p>
<p>2 Design an enterprise network.</p>	<p>2.1 Knowledge and complexities of alternative network infrastructures and currently available technologies are applied to network design. (See Note 3)</p> <p>2.2 Network design is developed to incorporate all required Wide Area Network (WAN) infrastructure, Internet connectivity and implementation and management strategies.</p> <p>2.3 Risk management strategies are sought and obtained for incorporating into the network design.</p>

- 2.4 Network design is reviewed against all inputs and adjusted to rectify any anomalies.
- 2.5 Network design proposal is documented in accordance with organisation policies and procedures.
- 2.6 Network design is presented and discussed with person(s) of higher authority.
- 2.7 Alterations to the network design resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation's policy.
- 2.8 Final design is documented and approval obtained from appropriate person(s).
- 3 Implement and manage an enterprise network.
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Server and client computer hardware are installed and configured in compliance with design specifications and network industry standards. (See Note 4)
  - 3.3 User and Group objects are created and group policy implemented. (Notes 5 and 6)
  - 3.4 Directory services, data storage, shared resources Internet information services, remote access and network security are managed to ensure effective operation of the network. (Notes 7 to 11)
  - 3.5 Approaches to issues/problems are analysed to provide most effective solutions.
  - 3.6 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.
- 4 Diagnose network malfunctions.
  - 4.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 4.2 Network operation is monitored and malfunctions are diagnosed to ascertain their cause using network diagnostic tools. (Note 12)
  - 4.3 Network malfunctions are rectified using effective techniques and drawing knowledge of network topology and complexities of network interactivity.
  - 4.4 Approaches to issues/problems are analysed to provide most effective solutions.

- |   |                                       |  |  |
|---|---------------------------------------|--|--|
|   | 4.5                                   | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards. |  |
| 5 | Report network management activities. | 5.1  | Written justification is produced for enterprise network services solutions and forwarded to appropriate person/s in accordance with established procedures. |
|   |                                       | 5.2  | Network service development records are maintained in accordance with established procedures.  |

## Notes.

1. Examples are company size, user and resource distribution, various site connectivity, bandwidth, service performance, availability and scalability, data and system access patterns, network roles and responsibilities and security considerations
2. Examples are currently available resources, services, network infrastructure, protocols and hosts, Transmission Control Protocol and Internet Protocol hardware, planned upgrades, support and network and systems management.
3. Examples of network infrastructure are topology, TCP/IP networking strategy, DHCP strategy, Design of name resolution services, Multi-protocol strategy and Distributed File Strategy
4. Hardware installation includes using qualified tools, driver signing options, digital signatures on driver files and systems support for legacy hardware devices.
5. Example of user and group objects are computer accounts, groups configuring accounts via a directory service, searching for objects, use of templates for creating user accounts and resetting accounts
6. Examples of group policy implementation are deploying software, updates and assigning and publishing applications.
7. Examples of directory services are publishing resources, performing searches and configuring printer objects
8. Examples of data storage are NTFS and FAT file systems such as New Technology File Systems (NTFS) and File Allocation Table (FAT), quotas, Encrypting File Systems, configuring volumes and basic and dynamic disks, file and folder permissions and compression and domain-based distributed file systems.
9. Examples of shared resources are folders, web sharing, folder permissions, printers and printer permissions.
10. Examples of Internet Information Services are virtual directories and servers, Internet and intranet browsing, authentication and Secure Sockets Layer (SSL), File Transfer Protocol (FTP) services and access permissions for intranet server
11. Examples of Network security are user account lockout settings, password management, Group Policy to run logon scripts and link objects, auditing and security log file.
12. Examples of network operations are routing TCP/IP, DHCP, Domain Name Service, name resolution, starting servers, client computers, User and group objects, directory service replication problems, End-User Group Policy and remote access.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe work practices and designing and managing enterprise networks.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.25.2 Network services design processes

2.4.26 Network services management processes

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation design and management of any enterprise network consisting of multiple sites and users and is to provide users with email and Internet access, shared resources and security.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Design and manage enterprise networks as described in 7) and including:
  - A Analysing business requirements.
  - B Analysing technical requirements.
  - C Obtaining approval for network design specification.
  - D Designing a practical network in compliance with specifications and industry standards.
  - E Implementing network design.
  - F Diagnosing and rectifying the cause of network malfunctions effectively.
  - G Documenting justification for network solutions.
  - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in design and manage enterprise networks.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.9; 1.10; 2.6; 2.7; 5.1; 5.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.7	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.9; 1.10; 2.6; 2.7	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3; 1.8; 2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5; 4.2; 4.3	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4; 4.2; 4.3	3

**Skills Enabling****8.7)**

**Employment**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.9 to 1.10; 2.6; 2.7; 5.1; 5.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3 to 2.7; 3.2 to 3.5; 4.2; 4.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.10
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5; 4.4

## UEENEED015A Administer user networks

### Unit Descriptor

1)

This unit covers the administration of network servers. It encompasses safe working practices, establishing and maintaining user and group permissions, network security and shared resource management, monitoring and optimising network systems performance and reliability, maintaining currency of the network and documenting all administration activities.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED024A Integrate multiple computer operating systems on a client server network

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to install, upgrade and maintain network operations.</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The nature of the network is established from network specifications and in consultation with appropriate person(s).</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Network operating system versions and updates needed to maintain the network are obtained in accordance with established procedures and checked against job requirements. (See Note 1)</p>
<p>2 Install, upgrade and maintain network operations.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Server operating systems in current use are installed and upgraded and configure in accordance with developer’s instructions and network requirements. (See Note 2)</p> <p>2.3 Devices and drivers, desktop environment, network protocols and services and system security are implemented in accordance with requirements.</p> <p>2.4 Access to resources is configured within the limitations specified for each users.</p> <p>2.5 Network malfunctions are identified and rectified using logical techniques and drawing knowledge of devices and drivers, storage, network protocols, connections and services and system security configuration processes.</p> <p>2.6 Network performance and reliability is monitored and optimised in accordance with established procedures.</p> <p>2.7 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p> <p>2.8 Network administration is carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or other services.</p>

	2.9	Written justification is produced for network maintenance and upgrading and appropriate person(s) notified in accordance with established procedures.
3	3.1	Document network administration activities. Network administration documentation are maintained in accordance with established procedures.
	3.2	OHS procedures for a given work area are identified, obtained and understood.

Notes:

1. Examples include complete version update, incremental (download) updates and security and bug patches.
2. Examples of operating systems are Windows 2000 Server and Unix variants.
3. Examples of optimising network performance include installing incremental OS updates and bug and security patches, removal of redundant components and maintaining storage capacity.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and administering user networks.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.27.1	Unix fundamentals
2.4.28	Network operating systems essentials
2.4.29	Network operating system implementation
2.18.1	Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to administering at least two networks each with a different server operating system in current use.

Note.

Examples of server operating systems in current use are Windows 2000 Server, Unix variants

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Administer user networks as described in 7) and including:
    - A Establishing network requirements and operating system versions and updates.
    - B Installing, upgrading and configuring server operating system correctly.
    - C Configuring access to resources for each user.
    - D Identifying network malfunctions.
    - E Rectifying network malfunctions.
    - F Documenting network administration activities.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in administering user networks..

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED019A Design and implement Internetworking systems-advanced routing

**Key competencies 8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.5; 2.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4; 3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.9
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEED016A    Develop network services

### Unit Descriptor

1)

This unit covers develop services for network clients for emails, Internet access, shared resources . It encompasses safe working practices, installing and configuring Domain Name Server (DNS), email servers, Dynamic Host Configuration Protocol (DHCP), remote access servers, Network Address Translation (N/AT), directory services, Authentication Servers and documenting development activities.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED015A    Administer user networks

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

### ELEMENT

### PERFORMANCE CRITERIA

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>	
<p><b>1 Prepare to develop network services.</b></p>	<p>1.1</p> <p>1.2</p> <p>1.3</p> <p>1.4</p> <p>1.5</p> <p>1.6</p>	<p>OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>The extent of network services to be developed is determined from network performance specifications and in consultation with relevant persons.</p> <p>Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>Appropriate development tools and software are selected based on specified requirements and performance standard.</p> <p>Strategies are implemented to ensure network development is carried out efficiently.</p>
<p><b>2 Install, configure and manage network services.</b></p>	<p>2.1</p> <p>2.2</p> <p>2.3</p> <p>2.4</p> <p>2.5</p> <p>2.6</p> <p>2.7</p>	<p>OHS risk control measures and procedures for carrying out the work are followed.</p> <p>Knowledge and complexities of network infrastructure are applied to developing network services.</p> <p>Network infrastructure components in current use and installed and configured in compliance with industry standards and variants as specified for the network. (See Note 1)</p> <p>Structural components of directory services are installed and configured in compliance with industry standards and variants as specified for the network. (Notes 2 and 3)</p> <p>Management components of network services are configured in compliance with industry standards and requirements specified for the network. (See Note 4)</p> <p>Security components of network services are created using Group Policy in compliance with industry standards and requirements specified for the network.</p> <p>Network malfunctions are identified and rectified using logical techniques and drawing knowledge of complex network infrastructure.</p>

	2.8	Network is monitored and solutions are developed to optimise network performance and reliability in accordance with established procedures.
	2.9	Security events are analysed and actions taken in accordance with established policy.
	2.10	Approaches to issues/problems are analysed to provide most effective solutions.
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.
3	Report network administration activities	
	3.1	Written justification is produced for network services development activities and appropriate person/s notified in accordance with established procedures.
	3.2	Network service development records are maintained in accordance with established procedures.

## Notes.

1. Examples of network infrastructure components are DNS, DHCP, Remote Access, Network Protocols, IP Routing and WINS
2. Examples of structural components are domains, automatic domain controller, sites, subnets, site links, connection objects and DNS.
3. Examples of configuring are site memberships global catalogue designation, zones for dynamic and secure dynamic updates and creation and configuration of DNS records.
4. Examples of management components are Group Policy including Group Policy Object (GPO), delegation of administrative control of Group Policy, filtering of Group Policy settings by using security groups and Group Policy prioritisation.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing network services.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.30	Network infrastructure
2.4.31	Directory services
2.18.1	Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation developing and managing services for any network that is to provide clients with email and Internet access, shared resources and security.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this

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#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop network services as described in 7) and including:
    - A Establishing network services to be developed.
    - B Installing and configuring network infrastructure components.
    - C Installing and configuring structural components of directory services.
    - D Configuring management components of network services.
    - E Creating security components of network services.
    - F Identifying and rectifying network malfunctions.
    - G Developing solutions to optimise network performance.
    - H Documenting network services development activities.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing network services.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.1	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.9	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.7; 3.8	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.10	3
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.6; 3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2 to 2.10
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.10

# UEENEED017A Install and configure Internetworking systems

## Unit Descriptor

1)

This unit covers the interconnection of networks using Open Systems Interconnection model (OSI) layer 2 and 3 devices. It encompasses safe working practice, basic installation and configuration of switches and routers and documenting installation and configuration activities.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

There are no prerequisite competencies for this unit.

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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## Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

## Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

## Competency Field

4)

Computer Systems

## ELEMENT

## PERFORMANCE CRITERIA

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to install and configure Internetworking systems.	1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
	1.3 The extent of Internetworking to be installed and configured is determined from Internetworking performance specifications and in consultation with relevant persons.
	1.4 Media and software required for Internetworking is selected in accordance with organisation’s established procedures.
	1.5 Network cabling test reports are obtained and reviewed to determine whether it complies with the required regulatory and performance standard.
	1.6 Appropriately competent/qualified person(s) are engaged to rectify non-compliance cabling.
	1.7 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
	1.8 Appropriate development tools and software are selected based on specified requirements and performance standard.
	1.9 Strategies are implemented to ensure network development is carried out efficiently.
2 Install and configure Internetworking systems.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of Internetworking arrangements and basic protocols are applied to installing and configuring routers and TCP/IP addresses.
	2.3 Access lists affording security of the network are created in compliance with industry standards and requirements specified for Internetworking.
	2.4 Common routing, TCP/IP and access malfunctions are identified and rectified using known solutions drawing knowledge of basic Internetworking arrangements and protocol.

	2.5	Approaches to issues/problems are analysed to provide most effective solutions.	
	2.6	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.	
3	Report install and configuring of Internetworking systems.	3.1	Written justification is produced for Internetworking installation and configuring activities and appropriate person/s notified in accordance with established procedures.
		3.2	Network services records are maintained in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and configuring networking systems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

	2.1.7.1	Performance (copper) data cable installation and terminations
	2.1.7.2	Coaxial cable installation and terminations
	2.1.7.3	Optical fibre cabling installation and terminations
	2.4.3.2	Networking fundamentals
	2.4.39	Internet, network basics
	2.2.40	Internet, network routing
	2.5.7	Technical standards, regulations and codes for telecommunications cabling
	2.18.1	Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing and configuring Internetworking systems between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or a LAN and the Internet.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other

terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this

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#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and configure networking systems as described in 7) and including:
    - A Establishing the extent of Internetworking installation.
    - B Selecting appropriate Internetworking media and software.
    - C Determining whether network cabling is compliant.
    - D Installing and configuring basic routing and TCP/IP protocols.
    - E Creating access list in compliance with industry standards and requirements specified for Internetworking.
    - F Identifying common routing, TCP/IP and access malfunctions.
    - G Applying known solutions to common routing, TCP/IP and access malfunctions.
    - H Documenting Internetworking installation and configuration activities.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and configuring networking systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies 8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 1.5; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.6; 1.7	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 1.9; 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.7 to 1.9; 3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.2 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

# UEENEED018A Design and implement Internetworking systems

## Unit Descriptor

1)

This unit covers the design, implementation and performance monitoring of Internetworking systems. It encompasses safe working practice, evaluating customer requirements, applying sound design principles, using Wide Area Network (WAN) technologies, complying with regulation and standards, and documentation of design and performance monitoring.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Competency in this unit may be assessed only after the following competencies have been confirmed.

UEENEED017A Install and configure Internetworking systems

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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## Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

## Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

## Competency Field

4)

Computer Systems

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to design Internetworking systems.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Design brief for the Internetworking is developed and documented in consultation with person(s) of higher authority.</p> <p>1.4 Work team/group is arranged of appropriately competent persons in accordance with skills required to meet work outcomes and organisation’s established procedures.</p> <p>1.5 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.6 Strategies are implemented to ensure network development is carried out efficiently.</p>
<p>2 Design Internetworking systems.</p>	<p>2.1 Internetworking system is designed to comply with design brief and consideration of economical and appropriately effective design solutions.</p> <p>2.2 Switching, routing and WAN technologies are included in the Internetworking system design. (See Notes 1 and 2)</p> <p>2.3 Internetworking system design includes specification of required media that is compliant with industry standards.</p> <p>2.4 Internetworking system design is documented in accordance with organisation policies and procedures.</p> <p>2.5 Internetworking system design is presented and discussed with person(s) of higher authority.</p> <p>2.6 Alterations to the Internetworking system design resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation’s policy.</p> <p>2.7 Final Internetworking system design is documented and approval obtained from person(s) of higher authority.</p>

- |   |                                    |     |  |
|---|------------------------------------|-----|--|
| 3 | Implement Internetworking systems. | 3.1 | Activities are planned to meet scheduled timelines in consultation with others involved in the work.   |
|   |                                    | 3.2 | Appropriate development tools and software are selected based on specified requirements and performance standard.  |
|   |                                    | 3.3 | Knowledge of Internetworking arrangements and protocols is applied to installing, configuring and testing switching, routing and WAN technologies.       |
|   |                                    | 3.4 | System malfunctions are identified during testing and rectified using logical techniques drawing knowledge of Internetworking arrangements and protocol. |
|   |                                    | 3.5 | Approaches to issues/problems are analysed to provide most effective solutions.  |
|   |                                    | 3.6 | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.                         |
|   |                                    | 3.7 | Final Internetworking system design and implementation are documented in accordance organisation’s established procedures.                               |

Note.

1. Examples of switching and routing technologies are basics of OSPF, basics of EIGRP, switch configuration, Spanning Tree Protocol (STP) and Virtual Local Area Networks (VLANs)
2. Examples of Wide Area Network (WAN) technologies are ISDN, Frame Relay, Point-to-Point Protocols (PPP)

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and implementing Internetworking systems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.4.41 | Internet, local area networks             |
| 2.4.42 | Internet, wide area networks              |
| 2.18.1 | Occupational Health and Safety principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing and implementing Internetworking systems between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or

a LAN and the Internet.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and implement Internetworking systems as described in 7) and including:
    - A Developing an Internetworking system design brief.
    - B Planning work activities including requirements for work team/group.
    - C Designing Internetworking system based on economic and effective solution that meet with design brief requirements.
    - D Detailing switching, routing and WAN technologies and specification for Internetworking media in the design.
    - E Documenting and presenting design for approval.
    - F Implementing Internetworking system design.
    - G Identifying and rectifying system malfunctions.

- H Documenting Internetworking installation and configuration activities.
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing and implementing Internetworking systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEED019A Design and implement Internetworking systems – advance routing
- UEENEED020A Design and implement Internetworking systems – remote access
- UEENEED021A Design and implement Internetworking systems – multi-layer switching
- UEENEED022A Design and implement Internetworking systems – security

UEENEED023A Design and implement Internetworking systems  
– wireless LANs/WANs

**Key competencies 8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 2.6; 2.7; 3.7	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.6; 2.7	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3; to 1.6; 2.1 to 2.3; 2.6; 3.4; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3; 3.1 to 3.5	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.7; 3.7
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5

## UEENEED019A Design and implement Internetworking systems – advanced routing

### Unit Descriptor

1)

This unit covers the design, implementation and performance monitoring of Internetworking systems. It encompasses safe working practice, evaluating customer requirements, applying sound design principles, complying with regulation and standards, incorporation and advance configuration of remote access and documentation of design and performance monitoring.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been acquired.

UEENEED018A Design and implement Internetworking systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Prepare to design Internetworking systems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Design brief for the advanced routing is developed and documented in consultation with person(s) of higher authority.
- 1.4 Work team/group is arranged of appropriately competent persons in accordance with skills required to meet work outcomes and organisation’s established procedures.
- 1.5 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.6 Strategies are implemented to ensure network development is carried out efficiently.

2 Design Internetworking systems.

- 2.1 Internetworking system is designed to comply with design brief and consideration of economical and appropriately effective design solutions.
- 2.2 Advanced routing technologies are included in the Internetworking system design. (See Note)
- 2.3 Internetworking system design includes specification of required media that is compliant with industry standards.
- 2.4 Internetworking system design is documented in accordance with organisation policies and procedures.
- 2.5 Internetworking system design is presented and discussed with person(s) of higher authority.
- 2.6 Alterations to the Internetworking system design resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation’s policy.
- 2.7 Final Internetworking system design is documented and approval obtained from person(s) of higher authority.

- |   |                                    |     |  |
|---|------------------------------------|-----|--|
| 3 | Implement Internetworking systems. | 3.1 | Activities are planned to meet scheduled timelines in consultation with others involved in the work.   |
|   |                                    | 3.2 | Appropriate development tools and software are selected based on specified requirements and performance standard.  |
|   |                                    | 3.3 | Knowledge of Internetworking arrangements and protocols is applied to installing, configuring and testing advance routing technologies.                  |
|   |                                    | 3.4 | System malfunctions are identified during testing and rectified using logical techniques drawing knowledge of Internetworking arrangements and protocol. |
|   |                                    | 3.5 | Approaches to issues/problems are analysed to provide most effective solutions.  |
|   |                                    | 3.6 | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.                         |
|   |                                    | 3.7 | Final Internetworking system design and implementation are documented in accordance organisation’s established procedures.                               |

Note.

Examples of advanced routing technologies are scalable IP addresses, technologies to redistribute and support multiple, advanced, IP routing protocols such as OSPF, EIGRP, and BGP, access lists (security) and edge router connectivity into BGP networks

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and implementing Internetworking systems advanced routing.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.34 Routing methods and protocols

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing and implementing Internetworking systems advanced routing between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or a LAN and the Internet.

Generic terms used throughout this Vocational Standard shall be regarded as part of the

Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this

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#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and implement Internetworking systems – advanced routing as described in 7) and including:
    - A Developing a design brief for advance routing in a Internetworking system.
    - B Planning work activities including requirements for work team/group.
    - C Designing advanced routing based on economic and effective solution that meet with design brief requirements.
    - D Detailing advanced routing technologies and specification for Internetworking media in the design.
    - E Documenting and presenting design for approval.
    - F Implementing Internetworking system design.
    - G Identifying and rectifying system malfunctions.
    - H Documenting Internetworking installation and configuration activities.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

Resources required to assess this unit are listed above in Context of assessment’, which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency in designing and implementing Internetworking systems – advanced routing.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEED018A Design and implement Internetworking systems
- UEENEED020A Design and implement Internetworking systems – remote access
- UEENEED021A Design and implement Internetworking systems – multi-layer switching
- UEENEED022A Design and implement Internetworking systems – security
- UEENEED023A Design and implement Internetworking systems – wireless LANs/WANs

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed

in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 2.6; 2.7; 3.7	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.6; 2.7	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3; to 1.6; 2.1 to 2.3; 2.6; 3.4; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3; 3.1 to 3.5	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.7; 3.7
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5

# UEENEED020A Design and implement Internetworking systems – remote access

## Unit Descriptor

1)

This unit covers the design, implementation and performance monitoring of Internetworking systems. It encompasses safe working practice, evaluating customer requirements, applying sound design principles, complying with regulation and standards, incorporation and advance configuration of remote access and documentation of design and performance monitoring.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been acquired.

UEENEED018A Design and implement Internetworking systems

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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## Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

## Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

## Competency Field

4)

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Prepare to design Internetworking systems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Design brief for the advanced remote access is developed and documented in consultation with person(s) of higher authority.
- 1.4 Work team/group is arranged of appropriately competent persons in accordance with skills required to meet work outcomes and organisation’s established procedures.
- 1.5 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.6 Strategies are implemented to ensure network development is carried out efficiently.

2 Design Internetworking systems.

- 2.1 Internetworking system is designed to comply with design brief and consideration of economical and appropriately effective design solutions.
- 2.2 Advanced remote access technologies are included in the Internetworking system design. (See Note)
- 2.3 Internetworking system design includes specification of required media that is compliant with industry standards.
- 2.4 Internetworking system design is documented in accordance with organisation policies and procedures.
- 2.5 Internetworking system design is presented and discussed with person(s) of higher authority.
- 2.6 Alterations to the Internetworking system design resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation’s policy.

- |   |                                    |     |  |
|---|------------------------------------|-----|--|
| 3 | Implement Internetworking systems. | 2.7 | Final Internetworking system design is documented and approval obtained from person(s) of higher authority.  |
|   |                                    | 3.1 | Activities are planned to meet scheduled timelines in consultation with others involved in the work.   |
|   |                                    | 3.2 | Appropriate development tools and software are selected based on specified requirements and performance standard.  |
|   |                                    | 3.3 | Knowledge of Internetworking arrangements and protocols is applied to installing, configuring and testing advance routing technologies.                  |
|   |                                    | 3.4 | System malfunctions are identified during testing and rectified using logical techniques drawing knowledge of Internetworking arrangements and protocol. |
|   |                                    | 3.5 | Approaches to issues/problems are analysed to provide most effective solutions.  |
|   |                                    | 3.6 | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.                         |
|   |                                    | 3.7 | Final Internetworking system design and implementation are documented in accordance organisation’s established procedures.                               |

Note.

Examples of advanced remote access technologies are asynchronous connections, Point-to-Point Protocol (PPP) architecture, protocol, call back, and compression ISDN architecture, protocol layers, BRI and DDR and X.25, Frame Relay, and AAA

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and implementing Internetworking systems remote access.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.35 Networks, remote access

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation the designing and implementing advanced remote

access technologies in an Internetworking system between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or a LAN and the Internet.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and implement Internetworking systems – remote access as described in 7) and including:
    - A Developing a design brief for advanced remote access technologies in an Internetworking system.
    - B Planning work activities including requirements for work team/group.
    - C Designing Internetworking system based on economic and effective solution that meet with design brief requirements
    - D Detailing advanced remote access technologies and specification for Internetworking media in the design.
    - E Documenting and presenting design for approval.
    - F Implementing Internetworking system design.
    - G Identifying and rectifying system malfunctions.
    - H Documenting Internetworking installation and configuration activities.

- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing and implementing Internetworking systems – remote access.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- |             |  |
|-------------|--|
| UEENEED018A | Design and implement Internetworking systems                         |
| UEENEED019A | Design and implement Internetworking systems – advance routing       |
| UEENEED021A | Design and implement Internetworking systems – multi-layer switching |
| UEENEED022A | Design and implement Internetworking systems – security              |
| UEENEED023A | Design and implement Internetworking systems – wireless LANs/WANs    |

**Key competencies 8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 2.6; 2.7; 3.7	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.6; 2.7	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3; to 1.6; 2.1 to 2.3; 2.6; 3.4; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3; 3.1 to 3.5	3

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills

enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.7; 3.7
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5

## **UEENEED021A Design and implement Internetworking systems – multi-layer switching**

### **Unit Descriptor**

1)

This unit covers the design, implementation and performance monitoring of Internetworking systems. It encompasses safe working practice, evaluating customer requirements, applying sound design principles, complying with regulation and standards, incorporation and advance multi-layer switching technologies access and documentation of design and performance monitoring.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit may be assessed with or only after the following competency has been acquired.

UEENEED018A Design and implement Internetworking systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to design Internetworking systems.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Design brief for the advance multi-layer switching technologies is developed and documented in consultation with person(s) of higher authority.</p> <p>1.4 Work team/group is arranged of appropriately competent persons in accordance with skills required to meet work outcomes and organisation’s established procedures.</p> <p>1.5 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.6 Strategies are implemented to ensure network development is carried out efficiently.</p>
<p>2 Design Internetworking systems.</p>	<p>2.1 Internetworking system is designed to comply with design brief and consideration of economical and appropriately effective design solutions.</p> <p>2.2 Advance multi-layer switching technologies are included in the Internetworking system design. (See Note)</p> <p>2.3 Internetworking system design includes specification of required media that is compliant with industry standards.</p> <p>2.4 Internetworking system design is documented in accordance with organisation policies and procedures.</p> <p>2.5 Internetworking system design is presented and discussed with person(s) of higher authority.</p> <p>2.6 Alterations to the Internetworking system design resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation’s policy.</p> <p>2.7 Final Internetworking system design is documented and approval obtained from person(s) of higher authority.</p>

- |   |                                    |     |  |
|---|------------------------------------|-----|--|
| 3 | Implement Internetworking systems. | 3.1 | Activities are planned to meet scheduled timelines in consultation with others involved in the work.   |
|   |                                    | 3.2 | Appropriate development tools and software are selected based on specified requirements and performance standard.  |
|   |                                    | 3.3 | Knowledge of Internetworking arrangements and protocols is applied to installing, configuring and testing advance routing technologies.                  |
|   |                                    | 3.4 | System malfunctions are identified during testing and rectified using logical techniques drawing knowledge of Internetworking arrangements and protocol. |
|   |                                    | 3.5 | Approaches to issues/problems are analysed to provide most effective solutions.  |
|   |                                    | 3.6 | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.                         |
|   |                                    | 3.7 | Final Internetworking system design and implementation are documented in accordance organisation’s established procedures.                               |

Note.

Examples of multi-layer switching technologies are, Fast Ethernet, Gigabit Ethernet, VLAN basics, types, identification, and trunking protocol, Spanning Tree Protocol, MLS processes, and configuration and multicasting protocols and routing.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and implementing Internetworking systems multi-layer switching.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.36 Multi-layer switched networks

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing and implementing advance configuration of multi-layer switching in an Internetworking system between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or a LAN and the Internet.

Generic terms used throughout this Vocational Standard shall be regarded as part of the

Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and implement Internetworking systems – multi-layer switching as described in 7) and including:
    - A Developing a design brief for multi-layer switching technologies in an Internetworking system
    - B Planning work activities including requirements for work team/group
    - C Designing Internetworking system based on economic and effective solution that meet with design brief requirements
    - D Detailing multi-layer switching technologies and specification for Internetworking media in the design
    - E Documenting and presenting design for approval
    - F Implementing Internetworking system design
    - G Identifying and rectifying system malfunctions
    - H Documenting Internetworking installation and configuration activities
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing and implementing Internetworking systems – multi-layer switching.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEED018A Design and implement Internetworking systems
- UEENEED019A Design and implement Internetworking systems – advance routing
- UEENEED020A Design and implement Internetworking systems – remote access
- UEENEED022A Design and implement Internetworking systems – security
- UEENEED023A Design and implement Internetworking systems – wireless LANs/WANs

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 2.6; 2.7; 3.7	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.6; 2.7	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3; to 1.6; 2.1 to 2.3; 2.6; 3.4; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3; 3.1 to 3.5	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.7; 3.7
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5

## **UEENEED022A Design and implement Internetworking systems – security**

### **Unit Descriptor**

1)

This unit covers the design, implementation and performance monitoring of Internetworking systems. It encompasses safe working practice, evaluating customer requirements, applying sound design principles, complying with regulation and standards, incorporation of advance security technologies and documentation of design and performance monitoring.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit may be assessed with or only after the following competency has been acquired.

UEENEED018A Design and implement Internetworking systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

### **ELEMENT**

### **PERFORMANCE CRITERIA**

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>	
<p><b>1 Prepare to design Internetworking systems.</b></p>	<p>1.1</p> <p>1.2</p> <p>1.3</p> <p>1.4</p> <p>1.5</p> <p>1.6</p>	<p>OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>Design brief for the advance security technologies is developed and documented based on organisation’s assessment of its security vulnerabilities in consultation with person(s) of higher authority.</p> <p>Work team/group is arranged of appropriately competent persons in accordance with skills required to meet work outcomes and organisation’s established procedures.</p> <p>Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>Strategies are implemented to ensure network development is carried out efficiently.</p>
<p><b>2 Design Internetworking systems.</b></p>	<p>2.1</p> <p>2.2</p> <p>2.3</p> <p>2.4</p> <p>2.5</p> <p>2.6</p> <p>2.7</p>	<p>Internetworking system is designed to comply with design brief and consideration of economical and appropriately effective design solutions.</p> <p>Advance security technologies are included in the Internetworking system design. (See Note)</p> <p>Internetworking system design includes specification of required media that is compliant with industry standards.</p> <p>Internetworking system design is documented in accordance with organisation policies and procedures.</p> <p>Internetworking system design is presented and discussed with person(s) of higher authority.</p> <p>Alterations to the Internetworking system design resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation’s policy.</p> <p>Final Internetworking system design is documented and approval obtained from person(s) of higher authority.</p>

- |   |                                    |     |  |
|---|------------------------------------|-----|--|
| 3 | Implement Internetworking systems. | 3.1 | Activities are planned to meet scheduled timelines in consultation with others involved in the work.   |
|   |                                    | 3.2 | Appropriate development tools and software are selected based on specified requirements and performance standard.  |
|   |                                    | 3.3 | Knowledge of Internetworking arrangements and protocols is applied to installing, configuring and testing advance routing technologies.                  |
|   |                                    | 3.4 | System malfunctions are identified during testing and rectified using logical techniques drawing knowledge of Internetworking arrangements and protocol. |
|   |                                    | 3.5 | Approaches to issues/problems are analysed to provide most effective solutions.  |
|   |                                    | 3.6 | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.                         |
|   |                                    | 3.7 | Final Internetworking system design and implementation are documented in accordance with organisation’s established procedures.                          |

Note.

1. Examples of advance security technologies are firewalls intrusion detection feature of CSACS, Cisco IOS routers, PIX for AAA service, site-to-site VPNs between Cisco devices and remote access VPNs between Cisco device and clients.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and implementing Internetworking systems security.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.37 Fundamentals of network security

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing and implementing Internetworking systems security between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or a LAN and the Internet.

Generic terms used throughout this Vocational Standard shall be regarded as part of the

Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this

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#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and implement Internetworking systems – security as described in 7) and including:
    - A Developing a design brief for advance security technologies in an Internetworking system design brief.
    - B Planning work activities including requirements for work team/group.
    - C Designing Internetworking system based on economic and effective solution that meet with design brief requirements.
    - D Detailing advance security technologies and specification for Internetworking media in the design.
    - E Documenting and presenting design for approval.
    - F Implementing Internetworking system design.
    - G Identifying and rectifying system malfunctions.
    - H Documenting Internetworking installation and configuration activities.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing and implementing Internetworking systems – security.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEED019A Design and implement Internetworking systems – advance routing
- UEENEED020A Design and implement Internetworking systems – remote access
- UEENEED021A Design and implement Internetworking systems – multi-layer switching
- UEENEED023A Design and implement Internetworking systems – wireless LANs/WANs

**Key competencies 8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 2.6; 2.7; 3.7	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.6; 2.7	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3; to 1.6; 2.1 to 2.3; 2.6; 3.4; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3; 3.1 to 3.5	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.7; 3.7
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5

## **UEENEED023A Design and implement Internetworking systems – wireless LANs/WANs**

### **Unit Descriptor**

1)

This unit covers the design, implementation and performance monitoring of Internetworking systems. It encompasses safe working practice, evaluating customer requirements, applying sound design principles, complying with regulation and standards, incorporation and advance wireless LANs technologies and documentation of design and performance monitoring.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit may be assessed with or only after the following competency has been acquired.

UEENEED018A Design and implement Internetworking systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

## ELEMENT

## PERFORMANCE CRITERIA

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1	Prepare to design Internetworking systems.	1.1	OHS processes and procedures for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	Design brief for the advance wireless LANs technologies is developed and documented in consultation with person(s) of higher authority.
		1.4	Work team/group is arranged of appropriately competent persons in accordance with skills required to meet work outcomes and organisation’s established procedures.
		1.5	Activities are planned to meet scheduled timelines in consultation with others involved in the work.
		1.6	Strategies are implemented to ensure network development is carried out efficiently.
2	Design Internetworking systems.	2.1	Internetworking system is designed to comply with design brief and consideration of economical and appropriately effective design solutions.
		2.2	Advance wireless LANs technologies are included in the Internetworking system design. (See Note 1)
		2.3	Internetworking system design includes specification of required media that is compliant with industry standards.
		2.4	Internetworking system design is documented in accordance with organisation policies and procedures.
		2.5	Internetworking system design is presented and discussed with person(s) of higher authority.
		2.6	Alterations to the Internetworking system design resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation’s policy.
		2.7	Final Internetworking system design is documented and approval obtained from person(s) of higher authority.

- |   |                                    |     |  |
|---|------------------------------------|-----|--|
| 3 | Implement Internetworking systems. | 3.1 | Activities are planned to meet scheduled timelines in consultation with others involved in the work.   |
|   |                                    | 3.2 | Appropriate development tools and software are selected based on specified requirements and performance standard.  |
|   |                                    | 3.3 | Knowledge of Internetworking arrangements and protocols is applied to installing, configuring and testing advance wireless LANs technologies.  |
|   |                                    | 3.4 | System malfunctions and performance issues are identified during testing and rectified using logical techniques drawing knowledge of Internetworking arrangements and protocol. (See Note 2) |
|   |                                    | 3.5 | Approaches to issues/problems are analysed to provide most effective solutions.  |
|   |                                    | 3.6 | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.   |
|   |                                    | 3.7 | Final Internetworking system design and implementation are documented in accordance with organisation’s established procedures.  |

Note.

1. Wireless LAN technologies include compliance with IEEE 802.11 standards, and frequency and channel usage, in-building and building-to-building WLANs and devices and appropriate antennas that meet mobility and throughput specifications, hardware set-up and software configuration of Cisco Aironet wireless products including security using WEP, Cisco LEAP, and 802.1x protocols.
2. Performance issues include using event logging, command-line utilities, and diagnostic tools

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and implementing Internetworking systems wireless LANs/WANs.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.38 Fundamentals of wireless security

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing and implementing Internetworking systems security between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or a LAN and the Internet.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and implement Internetworking systems – wireless LANs and WANs as described in 7) and including:
    - A Developing a design brief for advance wireless LAN technologies in an Internetworking system design brief.
    - B Planning work activities including requirements for work team/group.
    - C Designing Internetworking system based on economic and effective solution that meet with design brief requirements.
    - D Detailing advance wireless LANs technologies and specification for Internetworking media in the design.
    - E Documenting and presenting design for approval.
    - F Implementing Internetworking system design.
    - G Identifying and rectifying system malfunctions.

- H Documenting Internetworking installation and configuration activities.
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing and implementing Internetworking systems – wireless LANs/WANs.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEED018A Design and implement Internetworking systems
- UEENEED019A Design and implement Internetworking systems – advance routing
- UEENEED020A Design and implement Internetworking systems – remote access
- UEENEED021A Design and implement Internetworking systems – multi-layer switching

UEENEED022A Design and implement Internetworking systems  
– security

### Key competencies 8.6)

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 2.6; 2.7; 3.7	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3; 3.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 2.6; 2.7	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  1.3; to 1.6; 2.1 to 2.3; 2.6; 3.4; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3; 3.1 to 3.5	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.7; 3.7
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5

## UEENEED024A Integrate multiple computer operating systems on a client server network

### Unit Descriptor

1)

This unit covers interconnecting computers to form a local area network (LAN). It encompasses applying different computer and network operating systems on a single LAN, using network standards and protocols, selecting network topology and physical media, disaster planning recovery, performance management and documentation of work activities.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED012A Support computers hardware and software

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to install multiple operating systems on computers and a client server network.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Operating systems, devices, software and services required are determined from network performance specifications and in consultation with persons of higher authority.</p> <p>1.4 Network security policy is reviewed in network performance specifications and in consultation with person(s) of higher authority.</p> <p>1.5 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.6 Appropriate persons are consulted to ensure the work is coordinated effectively with others involved or affected by the work.</p>
<p>2 Install and configure computer and network operating systems.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of computer and networks operations and network infrastructure are applied to installing and configuring operating systems and software on computers and client server.</p> <p>2.3 Network protocols are installed and configured to integrate computers using different operating systems in compliance with industry standards and variants as specified for the network.</p> <p>2.4 Security measures of the network are implemented in compliance with security policy, industry standards and requirements specified for the network.</p> <p>2.5 Disaster recovery plan is tested for absolute effectiveness and compliance with enterprise security policy.</p> <p>2.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p>

3	Monitor and optimise computer and network performance.	3.1	OHS risk control measures and procedures for carrying out the work are followed.
		3.2	Network is monitored and common methods are implemented to optimise system performance.
		3.3	Common computer and server malfunctions are identified and rectified using logical techniques and known solutions.
		3.4	Computer and server operating system incremental updates and security patches are installed as soon as they are available.
		3.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
		3.6	On-going checks of the quality of work outcomes are undertaken in accordance with job specification, technical standards, enterprise policy and/or regulatory requirements.
		3.7	Work is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
4	Report integration and outcome of network monitoring activities.	4.1	Written justification is produced for solutions used to rectify malfunctions and appropriate person/s notified in accordance with established procedures.
		4.2	Computer and network installation and monitoring records are maintained in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and integrating multiple computer operating systems on a client server network.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.32	Operating systems and networks fundamentals
2.4.33	Operating systems and networks
2.18.1	Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation at least two different operating systems for a client server and at least two computers connected to the server to form a client server network.

Note.

Examples of operating systems are various iteration of Windows, OS/2, Unix variants such as Linux and Mac OS X.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety

and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Integrate multiple computer operating systems on a client server network as described in 7) and including:
    - A Determining the correct operating system, devices software and services required.
    - B Installing and configuring computer and client server operating system and software.
    - C Implementing system security measure in compliance with enterprise security policy.
    - D Testing effectiveness of disaster recovery plan.
    - E Using common methods to optimise system performance.

- F Identifying and rectifying common malfunctions using known solutions.
- G Providing credible justification for solutions used to rectify malfunctions.
- H Maintaining computer and network monitoring and records accurately.
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in integrating multiple computer operating systems on a client server network.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED012A Support computers hardware and software

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

## Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6	4
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.2; 3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.5; 3.2 to 3.4	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.5; 1.6; 4.1; 4.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5; 3.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6; 3.5

## UEENEED025A Design and configure Human-Machine Interface networks

### Unit Descriptor

1)

This unit covers monitoring and maintaining the operation of distributive and central control system networks. It encompasses safe working practices, installing and configuring controllers and devices, monitoring system operations, diagnosing malfunctions and faults and documenting development activities.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED008A Develop, enter and verify programs in Supervisory Control and Data Acquisition systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to manage control system networks.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of control system networks is determined from network specifications/design brief and in consultation with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Appropriate management tools and software are selected based on specified requirements and performance standard.</p> <p>1.6 Strategies are implemented to ensure network development is carried out efficiently.</p>
<p>2 Install, configure and manage control system networks.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge and complexities of control system networks infrastructure are applied to managing network services.</p> <p>2.3 Network infrastructure components are installed and configured in compliance with industry standards and variants as specified for the network.</p> <p>2.4 Structural components of directory services are installed and configured in compliance with industry standards and variants as specified for the network.</p> <p>2.5 Management components of network control system are configured in compliance with industry standards and requirements specified for the network.</p> <p>2.6 Security components of network control system are created in compliance with industry standards and requirements specified for the network.</p> <p>2.7 Network malfunctions are identified and rectified using logical techniques and drawing knowledge of complex network control system infrastructure.</p>

- |   |   |   |  |
|---|---|---|--|
|   | 2.8                                       | Network is monitored and solutions are developed to optimise network performance and reliability in accordance with established procedures. |  |
|   | 2.9                                       | Security events are analysed and actions taken in accordance with established policy.   |  |
|   | 2.10                                      | Approaches to issues/problems are analysed to provide most effective solutions.   |  |
|   | 2.11                                      | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.            |  |
| 3 | Report network administration activities. | 3.1   | Written justification is produced for network services development activities and appropriate person/s notified in accordance with established procedures. |
|   |   | 3.2   | Network service development records are maintained in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and configuring Human-Machine Interface networks.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |        |   |
|--|--------|---|
|  | 2.3.11 | Control system network basics             |
|  | 2.4.30 | Network infrastructure                    |
|  | 2.18.1 | Occupational Health and Safety principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to safe working practices and designing and configuring Human-Machine Interface networks

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and configure Human-Machine Interface networks as described in 7) and including:
    - A Establishing network services to be developed.
    - B Installing and configuring network infrastructure components.
    - C Installing and configuring structural components of directory services.
    - D Configuring management components of network services.
    - E Creating security components of network services.
    - F Identifying and rectifying network malfunctions.
    - G Developing solutions to optimise network performance.
    - H Documenting network services development

activities.

- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in design and configure Human-Machine Interface networks.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies 8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.1	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.9	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.7; 3.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.10	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.6; 3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2 to 2.10
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.10

## UEENEED026A Design a computer based control system

### Unit Descriptor

1)

This unit covers the design of computer application for control processes. It encompasses apply knowledge of control devices, control systems, programmable logic controllers, supervisory control and data acquisition systems and control programming methods, developing alternative design schemes based on design brief, customer relations and documenting designs.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED025A Design and configure Human-Machine Interface networks

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to augment formally-acquired competencies. It is suitable for employment-based programs under an approved contract of training. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to design engineering computer applications.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the proposed control system is determined from the design brief or in consultation with appropriate person(s).</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.</p>
<p>2 Develop engineering computer applications design.</p>	<p>2.1 Knowledge of control devices, control systems and control programming methods are applied to the design.</p> <p>2.2 Alternative concepts for the design are tested based on the requirements outlined in the design brief. (Note)</p> <p>2.3 Safety, functional and budget considerations are incorporated in the design.</p> <p>2.4 System design draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.5 System design is documented for submission to appropriate person(s) for approval.</p> <p>2.6 Solutions to unplanned situation are provided consistent with organisation’s policy.</p>
<p>3 Obtain approval for engineering computer applications design.</p>	<p>3.1 System design is presented and explained to client representative and/or other relevant person(s).</p> <p>3.2 Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation’s policy.</p> <p>3.3 Final design is documented and approval obtained from appropriate person(s).</p> <p>3.4 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.</p>

Note.

Design concepts should be tested by real or virtual prototyping where it cannot be shown easily by other means that particular aspects of the design meet specified requirements

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing a computer based control system.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.3.10.3	PLC system applications
2.3.12	Control network infrastructure
2.3.19	Control programming fundamentals
2.18.1	Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing a computer based control system incorporating at least five interacting subsystems modes.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design a computer based control system as described in 7) and including:
    - A Developing outlines of alternative designs.
    - B Developing the design within the safety and functional requirements and budget limitations.
    - C Documenting and presenting design effectively.
    - D Successfully negotiating design alteration requests.
    - E Obtaining approval for final design.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

### Context of and specific resources for assessment

#### 8.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in design a computer based control system.

### Method of assessment

#### 8.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE011A    Manage risk in electrotechnology activities

UEENEEE012A    Manage electrotechnology projects

UEENEEE013A    Plans electrotechnology project

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 2.6; 3.2	3

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	3
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEED027A    Develop structured programs for control sub systems to access external devices**

### **Unit Descriptor**

1)

This unit covers programming of microprocessor/microcontroller devices to access external devices. It encompasses working safely, applying knowledge of control applications, and analogue and digital input/output signals, programming fundamentals, writing and testing program and documenting programming activities.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to develop structured programs for control sub systems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of structure programming to be developed is determined from job performance specifications and in consultation with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Appropriate development kit and software are selected based on specified requirements and performance standard.</p> <p>1.6 Strategies are implemented to ensure programming is carried out efficiently.</p>
2 Develop structured programs for control sub systems.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of computer functions and features are applied to developing structure program.</p> <p>2.3 Correct structure and syntax is applied to developing structure program.</p> <p>2.4 Key features of the programming language are applied to develop and test solutions. (Note)</p> <p>2.5 Approaches to issues/problems are analysed to provide most effective solutions.</p> <p>2.6 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards</p>
3 Test and document structured program for control subsystems.	<p>3.1 Testing procedures are developed to test developed program.</p> <p>3.2 Problems and bugs in program are rectified to ensure specification in the creation of the code is met.</p>

- 3.3 Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person(s).

Note:

Although programming in 'C' is preferred any other structured language in current use by industry may be used.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing structured programs for control sub systems to access external devices.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.3.19 Control programming fundamentals

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing structured programs for control sub systems to access external devices including at least three of the following:

- Macros
- Global and local variables,
- Auto and static variables
- Intrinsic functions used in control
- Linking in external functions to control hardware

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best

utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in

accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop structured programs for control sub systems to access external devices as described in 7) and including:
    - A Using all key features of an appropriate programming language.
    - B Developing testing procedures.
    - C Identifying problem and bugs in program.
    - D Rectifying problem and bugs in program.
    - E Writing and presenting work reports to an acceptable standard.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in develop structured programs for control sub systems to access external devices.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no prerequisite competencies for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.1	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.7	2

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.1; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2 to 2.7; 3.1
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-	Refer to the following Performance Criteria for examples of application:

	routine or contingent situations	2.5; 3.2
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## **UEENEED028A      Develop and test basic specification for microcontroller equipped devices**

### **Unit Descriptor**

**1)**

This unit covers structured programming instructions for micro devices at a fundamental level. It encompasses working safely, applying knowledge device architecture and programming fundamentals, writing and testing specified instructions and documenting development activities.

Note.

In this unit the term ‘micro’ refers to microcontrollers however competency in the unit can be achieved using microprocessors.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

**4)**

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to develop and test basic specifications.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of specifications to be developed is determined from job performance requirements and in consultation with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Appropriate development kit and software are selected based on specified requirements and performance standard.</p> <p>1.6 Strategies are implemented to ensure programming is carried out efficiently.</p>
2 Develop basic specification.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of micro controller functions and features are applied to developing specifications.</p> <p>2.3 Correct structure and syntax is applied to developing program specification for target micro controller function.</p> <p>2.4 Key features of the assembler programming language are applied to develop and test solutions.</p> <p>2.5 Approaches to issues/problems are analysed to provide most effective solutions.</p> <p>2.6 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.</p>
3 Test and document the basic specification.	<p>3.1 Testing procedures are developed to analyse code developed.</p> <p>3.2 Problems and bugs are rectified to ensure specification in the creation of the code is met.</p>

- 3.3 Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing and test basic specification for microcontroller equipped devices.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.3.20 Microcontroller programming basics
- 2.9.5.1 Microprocessor fundamentals
- 2.9.5.2 Microcontroller fundamentals
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing and testing basic specification for micro equipped devices including at least three of the following:

- Selecting an appropriate micro for a given task
- Setting up and using basic input/output functions
- Using assembler/simulator software packages to debug program
- Finding system faults.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range

statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop and test basic specification for microcontroller equipped devices as described in 7) and including:
    - A Using all key features of an appropriate assembler language.
    - B Developing testing procedures.
    - C Identifying problem and bugs in program.
    - D Rectifying problem and bugs in program.
    - E Writing and presenting work reports to an acceptable standard.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in develop and test basic specification for microcontroller equipped devices.

**Method of**

**8.4)**

**assessment**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no prerequisite competencies for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.1	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	2
How are problem solving skills	Refer to the following Performance Criteria for examples of application:	

applied?	3.1; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 2.2 to 2.6; 3.1
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.5; 3.2

## **UEENEED029A      Develop basic web pages for engineering applications**

### **Unit Descriptor**

1)

This unit covers the development of web pages for engineering applications. It encompasses working safely, developing web pages using authoring tools, client-side scripting, fundamental server-side scripting and documenting development activities.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

This unit is supported by other competencies relevant to other electrical/electronic/control engineering.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

### **ELEMENT**

### **PERFORMANCE CRITERIA**

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to develop basic web pages for engineering applications.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of development work is determined from page development specifications, including engineering subject matter, and in consultation with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Appropriate development tools and software are selected based on specified requirements and performance standards.</p> <p>1.6 Strategies are implemented to ensure development work is carried out efficiently.</p>
<p>2 Develop basic web pages for engineering applications.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of syntax functions and features of mark-up languages scripts in current use are applied to developing client-side programming. (Notes 1 and 2)</p> <p>2.3 Pages are created and rendered with relative and absolute links, images and table formatting using cascaded styles sheets.</p> <p>2.4 Forms are created with a variety of appropriate elements and element groupings to make forms easy to follow.</p> <p>2.5 Knowledge of server scripting languages in current use is applied to scripting to developing client-side programming and validations. (See Note 3)</p> <p>2.6 Approaches to issues/problems are analysed to provide most effective solutions.</p> <p>2.7 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.</p>

- |   |   |     |   |
|---|---|-----|---|
| 3 | Test, evaluate, implement and document the developed web pages. | 3.1 | Testing and procedures are developed to evaluate web page programming.  |
|   |   | 3.2 | Problems and bugs in web page programming are identified and rectified to ensure specifications are met.                          |
|   |   | 3.3 | Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person(s). |

Note

1. Examples of mark-up languages are HTML, XML and XSL.
2. Examples of scripts are Javascript and VB script.
3. Examples of server scripting languages are JSP, ASP, PHP and Perl.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing basic web pages for engineering applications.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.4.21 | Client side programming                   |
| 2.4.22 | Server scripting                          |
| 2.18.1 | Occupational Health and Safety principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing web pages for any electrotechnology engineering disciplines. This shall include

- Development, implementation and testing HTML pages with at least four of the following features:
  - Relative and absolute links, images and table formatting
  - Cascaded styles sheets
  - Forms
  - New browser windows
  - Validation of form data
- Development, implementation and testing of server scripting for database access with at least four of the following features:

- Form data input response
- Form data processing
- Database access
- Output of database table contents
- Insertion of table data to database

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to

consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop basic web pages for engineering applications as described in 7) and including:
    - A Interpreting page development requirements.
    - B Identifying the appropriate development tools and software.
    - C Creating and rendering effective web pages.
    - D Providing basic web functionality.
    - E Developing testing procedures.
    - F Identifying problem and bugs in web page program.
    - G Rectifying problem and bugs.

- H Writing intermediate and final work reports to the required standard.
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in develop basic web pages for engineering applications.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.1; 3.2	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.7	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 3.1; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.2	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2 to 2.7; 3.1
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6; 3.2

**UEENEED030A                      Select, install, configure and test multimedia devices**

**Unit Descriptor**

1)

This unit covers assembly, setting-up and testing multimedia computer systems as directed in computer service manuals and device/driver documentation. It encompasses safe working practices, and selecting, installing, configuring and testing multimedia computer system components, applications, and driver software, following written and oral instruction and applying customer relations' procedures.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

**Prerequisite Unit(s)**

2)

**Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED002A    Assemble, set-up and test personal computers

**Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading        3        Writing        3        Numeracy        3

**Application of the Unit**

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment formally-acquired competencies.

**Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field**

4)

Computer Systems

**ELEMENT****PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Select and prepare to install multimedia components.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures in relation to computer and keyboard use are followed.
- 1.3 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.4 Multimedia components, drivers, and application software are obtained in accordance with established routines and checked as meeting requirements.
- 1.5 Multimedia devices, drivers, and application software are correctly selected given user requirements and manufacturer specifications.

2 Install multimedia components.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Multimedia components are assembled and connected in accordance with manufacturer instructions.
- 2.3 Multimedia devices, drivers, and application software are correctly selected given user requirements and manufacturer specifications.
- 2.4 Multimedia devices are correctly installed and where not hot pluggable, computer is switched on and start-up procedures are followed and checked.
- 2.5 Multimedia devices, operating system, application programs, and multimedia devices are to be checked to be opening and operating correctly.
- 2.6 Multimedia devices and drivers are tested to be working correctly and benchmarked against similar devices for performance comparisons.
- 2.7 Faults are identified as being the result of either faulty hardware or software.

- |   |                           |   |  |
|---|---------------------------|---|--|
|   | 2.8                       | Faults are rectified in accordance with computer hardware, operating system and application instructions in strict accordance with OHS requirements.                          |  |
|   | 2.9                       | Procedures for referring non-routine events to immediate supervisor for directions are followed.  |  |
|   | 2.10                      | Computer shutdown procedures are followed and computer switched off.  |  |
|   | 2.11                      | Work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles. |  |
| 3 | Complete work and report. | 3.1   | OHS risk control work completion measures and procedures are followed.                               |
|   |                           | 3.2   | Work area is cleaned and made safe in accordance with established procedures.                        |
|   |                           | 3.3   | Work supervisor is notified of the completion of the work in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and selecting, installing, configuring and testing multimedia devices.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |   |
|--|----------|---|
|  | 2.4.12.2 | Multimedia computer components            |
|  | 2.18.1   | Occupational Health and Safety principles |
|  | 2.18.9   | Electronic Safe working practices         |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to assembling, setting-up, and testing multimedia computer systems as directed in computer service manuals and device/driver documentation. It is to include demonstrated competence across assembly, setting-up and testing multimedia computer devices on three occasions respectively, using computer service manuals and device/driver documentation.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Select, install, configure and test multimedia devices as described in 7) and including:
    - A Connecting computer, components and peripherals in accordance with requirements
    - B Assembling on three separate occasions multimedia computer devices
    - C Setting up on three separate occasions multimedia computer devices
    - D Testing on three separate occasions multimedia computer devices
    - E Documenting and reporting multimedia computer device activities and results.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in selecting, installing, configuring and testing multimedia devices.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.2; 3.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.4 to 3.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.2 to 3.6	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.4; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.5; 2.2 to 2.4; 3.2 to 3.6

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6; 3.7

## **UEENEED031A    Develop and validate basic integrated systems**

### **Unit Descriptor**

**1)**

This unit covers planning installations, developing instructions and validating integrated systems with up to three independent subsystems. It encompasses working safely, understanding operating parameters and capabilities, following instructions and documenting.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 3/4 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

### **Competency Field**

**4)**

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to develop and validate basic integrated systems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 The extent and nature of the integrated system is determined from design brief.</p> <p>1.3 Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.</p> <p>1.4 Work supervisor or customers are consulted to determine which functions of the system are to be use and the parameter of each and written confirmation sought.</p> <p>1.5 Software, tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Develop and validate basic integrated systems.	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of integrated systems, electrical and other services, installation performance standards, compliance methods and service equipment is applied to developing the integrated system.</p> <p>2.3 System installation requirements, equipment and instructions for the integrated system are incorporated in the development.</p> <p>2.4 Safety, functional and budgetary considerations are incorporated in the installation design.</p> <p>2.5 Equipment required for the integrated system is selected and obtained in accordance with the developed plan and established requirements.</p> <p>2.6 The required status of each function of system devices is entered and their parameters set in accordance manufactures programming instructions and customer’s requirements.</p> <p>2.7 Location of each device in the installation of the integrated system is documented to ensure correct operation of system functions.</p>

- |   |  |  |   |
|---|--|--|---|
|   | 2.8                                    | Solutions to unplanned situation are provided consistent with organisation's policy. |   |
| 3 | Validate integrated system and report. | 3.1  | System device operations are tested in strict accordance OHS requirements and procedures.                 |
|   |  | 3.2  | Operating anomalies are identified and corrected in accordance with established routines.                 |
|   |  | 3.3  | OHS work completion risk control measures and procedures are followed.                                    |
|   |  | 3.4  | Work site is cleaned and made safe in accordance with established procedures.                             |
|   |  | 3.5  | Work completion is documented and appropriate person(s) notified in accordance with established routines. |

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing and validating basic integrated systems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.3.16 Integrated systems basics

2.18.1 Occupational Health and Safety principles

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing and validating basic integrated systems with two independent subsystems one of which is lighting control.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Section 1, Clause 1.4.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop and validate basic integrated systems as described in 7) and including:
    - A Understanding required operating functions and parameters.
    - B Selecting appropriate equipment.
    - C Entering functions and parameters correctly.
    - D Testing and verify device operation.
    - E Correcting system anomalies effectively.
    - F Documenting development work.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in develop and validate basic integrated

systems.

### Method of assessment

#### 8.4)

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

### Concurrent assessment and relationship with other units

#### 8.5)

There are no concurrent assessment recommendations for this unit.

### Key competencies

#### 8.6)

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.5	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.7	2

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.8; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2

Note:  
Where dedicated application software is used in demonstrating competency, this unit may be assessed concurrently with UEENEED001A Use basic computer applications

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2; 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-	Refer to the following Performance Criteria for examples of application:

	routine or contingent situations	2.8
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## UEENEED032A Design integrated systems

### Unit Descriptor

1)

This unit covers designing systems for the control and management of services such as lighting, air conditioning, water use entertainment facilities, communications and the like for buildings and premises. It encompasses developing control scenarios based on a design brief, negotiating with architect/designer, builder and client, applying knowledge of integrated systems and protocols, developing design drawings and obtaining approval for final design.

Note.

This Unit is limited to systems with up to three inter working subsystems

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED031A Develop and validate basic integrated systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 5 level

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

### Competency Field

4)

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to design integrated systems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 The extent and nature of the integrated system is determined from design brief.</p> <p>1.3 Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved in the installation or associated work.</p> <p>1.5 Functions of the integrated system are determined from job specifications and/or and documented through discussions with appropriate person(s).</p>
2 Develop integrated systems design.	<p>2.1 Knowledge of integrated systems, building services installation performance standards, compliance methods and service equipment is applied to designing the integrated system.</p> <p>2.2 Alternative arrangements for the installation design are considered based on the requirements outlined in the design brief.</p> <p>2.3 System installation requirements, equipment and programming for the integrated system are incorporated into the design.</p> <p>2.4 Safety, functional and budgetary considerations are incorporated in the installation design.</p> <p>2.5 System design draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.6 System design is documented for submission to appropriate person(s) for acceptance and approval.</p> <p>2.7 Solutions to unplanned situation are provided consistent with organisation’s policy.</p>
3 Obtain approval for design.	3.1 System design is presented and explained to client representative and/or other relevant person(s).

- 3.2 Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation's policy.
- 3.3 Final design is documented and approval obtained from appropriate person(s).
- 3.4 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.

## **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing of integrated systems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.3.17 Integrated systems, subsystem inter working
- 2.18.1 Occupational Health and Safety principles

## **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing integrated systems with three inter working subsystems one of which is lighting control.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Section 1, Clause 1.4.

## **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range

statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design integrated systems as described in 7) and including:
    - A Developing outlines of alternative designs.
    - B Developing the design within the safety and functional requirements and budget limitations.
    - C Documenting and presenting design effectively.
    - D Successfully negotiating design alteration requests.
    - E Obtaining approval for final design.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in design of integrated systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE015A    Develop design briefs for electrotechnology projects

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2

Note:  
Where dedicated application software is used in demonstrating competency, this unit may be assessed concurrently with UEENEED001A Use basic computer applications

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.7

## **UEENEED033A      Design complex integrated systems**

### **Unit Descriptor**

**1)**

This unit covers designing large and networked systems for the control services and energy management in buildings and premises. It encompasses developing control scenarios based on a design specifications and/or brief, negotiating with architect/designer, builder and client, applying knowledge of integrated systems, networks and protocols, developing design drawings and obtaining approval for final design.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED032A      Design integrated systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 5 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

### **Competency Field**

**4)**

Computer Systems

### **ELEMENT**

### **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to design complex integrated systems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 The extent and nature of the integrated system is determined from design brief.</p> <p>1.3 Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved in the installation or associated work.</p>
2 Develop complex integrated systems design.	<p>2.1 Knowledge of complex integrated systems, building services installation performance standards, compliance methods and service equipment is applied to designing the integrated system.</p> <p>2.2 Alternative arrangements for the system design are considered based on the requirements outlined in the design brief.</p> <p>2.3 System installation requirements, equipment and programming for the integrated system are incorporated into the design.</p> <p>2.4 Safety, functional and budgetary considerations are incorporated in the installation design.</p> <p>2.5 System design draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.6 System design is documented for submission to appropriate person(s) for acceptance and approval.</p> <p>2.7 Solutions to unplanned situation are provided consistent with organisation’s policy.</p>
3 Obtain approval for design.	<p>3.1 System design is presented and explained to client representative and/or other relevant person(s).</p> <p>3.2 Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation’s policy.</p> <p>3.3 Final design is documented and approval obtained from appropriate person(s).</p>

- 3.4 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing complex integrated systems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.3.18 Complex integrated system programming

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing complex integrated systems with at interacting subsystems requiring the application of advance programming.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Design complex integrated systems as described in 7) and including:
  - A Developing outlines of alternative designs.
  - B Developing the design within the safety and functional requirements and budget limitations.
  - C Documenting and presenting design effectively.
  - D Successfully negotiating design alteration requests.
  - E Obtaining approval for final design.
  - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency designing complex integrated systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE015A Develop design briefs for electrotechnology projects

**Key competencies 8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2; to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: (See Note)	

Note:

Where dedicated application software is used in demonstrating competency, this unit may be assessed concurrently with UEENEED001A Use basic computer applications

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance.

See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

# UEENEED034A **Configure and maintain industrial control system networks**

## Unit Descriptor

1)

This unit covers installing, configuring and maintaining communication service on a control network. It encompasses safe working practices, applying knowledge of industrial control network topology and protocols, configuring data links, bus monitoring and system management and access, network testing and documenting system settings.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED015A Administer user networks

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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## Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

## Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

## Competency Field

4)

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Prepare to configure and maintain industrial control system networks.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the industrial control system and network is established from control system specifications and in consultation with appropriate person(s).
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Network operating system versions and updates needed to configure and maintain the network are obtained in accordance with established procedures and checked against job requirements.

2 Configure and maintain industrial control system networks.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Control application network components are installed, upgraded and configured in accordance with developer’s instructions and network requirements.
- 2.3 Devices, desktop environment, network protocols and services and system security are implemented in accordance with requirements.
- 2.4 Access to control data and resources is configured within the limitations specified for each user.
- 2.5 Network malfunctions are identified and rectified using logical techniques and drawing knowledge of control devices, storage, network protocols, connections and services and system security configuration processes.
- 2.6 Network performance and reliability is monitored and optimised in accordance with established procedures.
- 2.7 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.

	2.9	Network administration is carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or other services.
3 Document control system network configuration and maintenance activities.	3.1	Written justification is produced for network maintenance and upgrading and appropriate person(s) notified in accordance with established procedures.
	3.2	Network maintenance documentation is maintained in accordance with established procedures.

**REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and to configure and maintain industrial control system networks.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.3.11 Control system network basics
- 2.3.12 Control network infrastructure
- 2.18.1 Occupational Health and Safety principles

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to configuring and maintaining an industrial control system networks with at least three distributive control loops, two programmable controllers and one HMI system controller.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

- 8.1) Longitudinal competency development approaches to assessment,

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and

associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Configure and maintain industrial control system networks as described in 7) and including:
    - A Establishing industrial control system and network requirements and operating system versions and updates.
    - B Installing, upgrading and configuring control application network components correctly.
    - C Configuring access to control data and resources for each user.
    - D Identifying network malfunctions.
    - E Rectifying network malfunctions.
    - F Documenting network configuration and maintenance activities.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in configuring and maintaining industrial control system networks.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED015A Administer user networks

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.5	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  1.5; 2.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.6	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4; 3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.9
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7
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## **UEENEED043A      Install and configure a computer operating system and software**

### **Unit Descriptor**

1)

This unit covers installing and configuring an operating system and software on a personal computer. It encompasses safe working practices, installing and testing the operating system and application software, testing functionality, rectifying operating anomalies, following written and oral instruction and procedures and applying appropriate customer relations.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

### **ELEMENT**

### **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to install and configure a computer operating system and software.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The scope of work to be undertaken is determined from documentation or from discussions with work supervisor.</p> <p>1.4 Operating system and application software versions s needed upgrade for the installation are obtained in accordance with established procedures and checked against job requirements.</p>
2 Upgrade computer and peripheral software.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Operating system and application software components are installed in accordance with installation instructions and industry practices.</p> <p>2.3 Operating system, including device drivers, and application software are tested in preparation for return to service/customer.</p> <p>2.4 Operating system and software malfunctions are identified using logical techniques drawing on knowledge of operating system configuration requirements.</p> <p>2.5 Malfunctions are rectified using latest software versions, incremental updates and bug and security patches.</p> <p>2.6 Methods for dealing with unexpected situations are decided on the basis of safety and required work outcomes.</p> <p>2.7 Installation and configuration is carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or other services.</p>
3 Complete and report upgrading and	3.1 OHS work completion risk control measures and procedures are followed.

- maintenance activities.
- 3.2 Work area is cleaned and made safe in accordance with established procedures.
  - 3.3 Operating system and software installation is documented and appropriate person(s) notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and configuring a computer operating system and software.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.14 Personal computer operating systems, basics
- 2.4.15 Computer operating systems
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing and configuring operating system, including device drivers and at least one-application software types for a personal computer.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling

employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and configure a computer operating system and software as described in 7) and including:
    - A Obtaining appropriate operating and software versions.
    - B Installing and configuring operating system correctly.
    - C Installing and configuring software for an application correctly.
    - D Identifying and rectifying operating system and application malfunctions.
    - E Documenting installation activities.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and configuring a computer operating system and software.

### **Method of assessment**

#### **8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

8.5)

There are no concurrent assessment recommendations for this unit.

**Key competencies**

8.6)

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEED046A Set up and configure basic local area network

### Unit Descriptor

1)

This unit covers setting up, configuring and maintaining operation of a basic local area network (LAN) of up to 20 connected devices. It encompasses safe working practices, installing network hardware, installing and configuring network software, establish user accounts, configure shared Internet connection and documenting set up parameters and LAN topology.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED002A Assemble, set-up and test personal computers

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to set up and configure basic local area network.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 The extent of set-up and configuration work is determined from job specifications and in consultation with appropriate person(s).</p> <p>1.3 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.5 Hardware and software needed for the work is obtained in accordance with established procedures and checked against job requirements.</p> <p>1.6 Preparatory work is checked to ensure no damage has occurred and complies with requirements.</p>
2 Set up, configure and maintain basic local area network.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Layout of network hardware, cabling and outlets is determined from job specifications or in consultation with appropriate person(s).</p> <p>2.3 Hardware is installed in accordance with network requirements. (See Note 1)</p> <p>2.4 Network software is installed and configured in accordance with network requirements. (See Note 2)</p> <p>2.5 Network operations are tested and anomalies identified and corrected.</p> <p>2.6 Reported network failures and faults are responded to and appropriate tools and methods are used to</p> <p>2.7 Identified causes of reported problems are rectified and network is tested in accordance with established procedures.</p> <p>2.8 Unexpected situations are dealt with safely and with the approval of an authorised person.</p>

	2.9	Set-up configuration and maintenance are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3	Complete work and document activities.	3.1 OHS risk control work completion measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Network configuration and maintenance records are maintained in accordance with established procedures.
	3.4	Service report is completed and forwarded to appropriate person(s) in accordance with established procedures.

Notes.

1. Examples of hardware are network card, server, router, hub .
2. Examples of configuration are network protocols, user accounts and permissions, shared devices and security.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and to setting up and configuring a basic local area network.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.25.1 Local area network fundamentals

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to setting up and configuring basic local area network that include at least:

- 3 personal computers/work stations
- 1 server
- 1 hub or switch or router
- 1 input or output device

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up and configure basic local area network as described in 7) and including:
    - A Establishing the extent of work accurately.
    - B Obtaining specified hardware and software.
    - C Laying out network appropriately.
    - D Installing hardware as specified.
    - E Installing and configuring software to requirements.
    - F Identifying and correcting anomalies.
    - G Diagnosing and rectifying the cause of malfunctions effectively.
    - H Documenting network activities.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment****8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in set up and configure basic local area network.

**Method of assessment****8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.2 to 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5; to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2; to 2.7	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	1,3; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## UEENEED047A Manage computer projects

### Unit Descriptor

1)

This unit covers the management of computer projects involving design, modifications, installation, and/or maintenance of systems and equipment. It encompasses management of safety, budget, variation, personnel, resources, and critical path timelines all necessary progress and all completion documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.

### Licence to practise

3.1)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.

### Competency Field

4)

Computer Systems

### ELEMENT

### PERFORMANCE CRITERIA

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Establish the scope of the project.

1.1 OHS processes and procedures for a given work area are identified, obtained and understood.

- 1.3 Project deliverables and budget are established from project planning and other relevant documentation and from discussions with appropriate person(s).
- 1.3 Measurable outcomes are identified to evaluate the project on completion from project planning and other relevant documentation.
- 1.4 Plant, materials and skills needed to meet project outcomes are established from project planning and other relevant documentation.
- 1.5 Processes and procedures are developed for managing contract variations from discussions with appropriate person(s) and in accordance with contractual agreement.
- 2 Manage project.
  - 2.1 OHS policies, procedures and programs are implemented and monitored.
  - 2.2 Achievement of project outcomes is delegated to appropriately competent persons involved in the project.
  - 2.3 Risk events are identified and project strategies implemented to ensure that outcomes are achieved to standard of quality specified in the contract and to safety standards required by organisation’s policy.
  - 2.4 Procurement processes and procedures are monitored to ensure on-time supply of plant and materials and in accordance with organisation policy.
  - 2.5 Project progress is monitored against schedule, quality requirements and budget.
  - 2.6 Conflict issues at the work site and between stakeholders, clients and regulators are identified and managed in accordance with organisation’s policy.
  - 2.7 Variations are managed in accordance with agreed processes and in accordance with the contract.
  - 2.8 Project records are maintained and progress reports written and forwarded to all appropriate person(s).
- 3 Complete project.
  - 3.1 Project outcomes are reviewed against original plan, implemented risk strategies, contract variations, safety record and budget.

- 3.2 Project completion acceptance is sought from appropriate person(s) and hand-over documented in accordance with organisation policy.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and managing computer projects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.17 Project management
- 2.2.19 Customer/Client relations
- 2.2.27 Computer industry sector customs and practices
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to managing a computer system project with not less than the following features:

- Security
- Redundancy
- Scalability
- 100 users
- Catering multiple operating systems

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified

in the Performance Criteria and range statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Manage computer projects as described in 7) and including:
    - A Establishing the scope of the project accurately.
    - B Ascertaining the input a project.
    - C Developing effective management processes.
    - D Managing resources and variations effectively.
    - E Resolving conflicts.
    - F Adopting risk management strategies.
    - G Maintaining records and submitting progress reports.
    - H Meeting project outcomes.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in manage computer projects.

### Method of assessment

#### 8.4)

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

### Concurrent assessment and relationship with other units

#### 8.5)

There are no concurrent assessment recommendations for this unit

### Key competencies

#### 8.6)

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.4; 2.6 to 2.8	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	3

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3; 2.5; 2.7; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.3; 2.7; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.8; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6
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## UEENEED048A Plan computer systems projects

### Unit Descriptor

1)

This unit covers development and documentation of computer systems project proposals, milestones and completions. The unit encompasses, establishing budgets, critical path analysis, development of workflow strategies, documenting, presenting and negotiating budgets and timelines.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to plan project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established techniques for project planning are reviewed are adopted in accordance with organisation policies.</p> <p>1.3 The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).</p>
2 Develop project plan proposal.	<p>2.1 Estimated plant, material, labour and other costs are sought and obtained from appropriate person(s) in accordance with organisation policies and procedures.</p> <p>2.2 Project budget is established from estimated plant, material, labour and other costs in accordance with organisation policies and procedures.</p> <p>2.3 Knowledge of critical path analysis is applied to developing workflow strategies.</p> <p>2.4 Sources and availability of materials and human resources needed for the project are established in accordance with organisation policies and procedures.</p> <p>2.5 Risk management strategies are sought and obtained for incorporating into the project plan.</p> <p>2.6 Project plan is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>2.7 Project plan proposal is documented in accordance with organisation policies and procedures.</p>
3 Obtain approval for project plan.	<p>3.1 Project plan is presented and discussed with person(s) of higher authority.</p> <p>3.2 Alterations to the project plan resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation's policy.</p>

- 3.3 Final project plan is documented and approval obtained from appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and planning computer systems projects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.16.1 Project Planning
- 2.2.18 Critical path and project analysis
- 2.2.27 Computer industry sector customs and practices
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to managing a computer system project with not less than the following features:

- Security
- Redundancy
- Scalability
- 100 users
- Catering multiple operating systems

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best

utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in

accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan computer systems projects as described in 7) and including:
    - A Determining the project requirements accurately.
    - B Establishing a project budget.
    - C Developing effective work flow strategies.
    - D Documenting project plan proposal.
    - E Negotiating alterations to the proposed project plan successfully.
    - F Obtaining approval of the final plan.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in planning computer systems projects.

### **Method of**

#### **8.4)**

**assessment**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

**Note:**

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.2; 3.3	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.1; 2.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 3.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	2
How are problem solving skills	Refer to the following Performance Criteria for examples of application:	

applied?	2.3; 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3; 2.1; 2.2	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.7; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2; 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.2

## UEENEED050A **Develop control programs for microcomputer equipped devices**

### Unit Descriptor

1)

This unit covers development of hardware and programs to control external devices using microcomputers as apply to engineering product development work. It encompasses working safely, following design brief, applying knowledge of microcomputer architecture, constructing prototype devices, programming using assembler or ‘C’ programming language, testing device operation and documenting development work.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEED028A    Develop and test basic specification for microcontroller equipped devices

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p>1 Prepare to develop control programs for microcomputer equipped devices.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of development work is determined from design brief and in consultation with relevant persons.</p> <p>1.4 Development work is planned to meet scheduled timelines in consultation with others involved on the work site.</p> <p>1.5 Appropriate development tools and software are selected based on specified requirements and performance standards.</p> <p>1.6 Materials and devices/components required for the work are selected on compatibility of specifications with control requirements and project budget constraints.</p> <p>1.7 Strategies are implemented to ensure development work is carried out efficiently.</p>
<p>2 Develop control programs.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of computer-equipped devices and systems and compliance standards are applied to the design.</p> <p>2.3 Alternative arrangements for the development are considered based on the requirements outlined in the design brief.</p> <p>2.4 Safety, functional and budget considerations are incorporated in the design.</p> <p>2.5 Prototype devices and circuits are constructed and tested for compliance with the design brief and regulatory requirements.</p> <p>2.6 Knowledge of programming language code, functions and features in current use are applied to developing control programs.</p>

- |   |  |   |
|---|--|---|
|   | 2.7  | Prototype malfunctions are rectified and re-tested to ensure effective operation of design.                                       |
|   | 2.8  | Program development is documented for submission to appropriate person(s) for approval.   |
|   | 2.9  | Approaches to issues/problems are analysed to provide most effective solutions.   |
|   | 2.10   | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.  |
| 3 | Test, evaluate, implement and document control programs. |   |
|   | 3.1  | Testing and procedures are developed to evaluate control program.   |
|   | 3.2  | Problems and bugs in program are identified and rectified to ensure specifications are met.                                       |
|   | 3.3  | Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person(s). |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing control programs for microcomputer equipped devices.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.3.20   | Microcontroller programming basics                            |
| 2.4.44.1 | Microprocessor/microcontroller assembler language programming |
| 2.4.44.2 | High level programming  |
| 2.18.1   | Occupational Health and Safety principles                     |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing control programs for microcomputer equipped devices with at least five interacting functions and using a programming language currently used in industry.

Note.

Although 'C' and assembler languages are preferred, other relevant language in current industry use may be used.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this

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#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop control programs for microcomputer equipped devices as described in 7) and including:
    - A Determining the extent of development work requirements.
    - B Identifying the appropriate development tools and software.
    - C Selecting devices/components compatibility with control requirements and project budget constraints.
    - D Developing control program within the safety and functional requirements and budget limitations.
    - E Documenting and presenting program development effectively.
    - F Successfully negotiating program alteration requests.
    - G Obtaining approval for final program developed.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing control programs for microcomputer equipped devices.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	3

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.1; 3.2	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.7	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 3.1; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.2	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2 to 2.7; 3.1
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 3.2

## UEENEED051A Provide programming solution for engineering problems

### Unit Descriptor

1)

This unit covers developing, implementing and testing programming solutions, using a structure programming language. It encompasses following design brief using appropriate development software, writing code that features classes, inheritance, polymorphism, arrays and packages, creating applications (applets) and documenting development activities.

Note 1:

Typical engineering problems are those encountered in meeting requirements in a design brief, meeting performance requirements and compliance standards, revising a systems operating parameters and dealing with system malfunctions.

Note 2:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEEH012A Solve problems in digital components of electronic apparatus

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field**

4)

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Prepare to develop programming solution.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of engineering problem is determined from performance specifications and situation reports and in consultation with relevant persons.
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Appropriate development kit and software tools are selected based on specified requirements and performance standard.
- 1.6 Strategies are implemented to ensure programming is carried out efficiently.

2 Develop programming solutions.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of programming functions and features are applied to providing a programming solution.
- 2.3 Code in existing programs is analysed and alteration or corrections made to modify or rectify program performance.
- 2.4 Key features of the programming language are applied to develop and test solutions. (Note)
- 2.5 Approaches to issues/problems are analysed to provide most effective solutions.
- 2.6 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.

3 Test and document the programming

- 3.1 Testing procedures are developed to analyse code developed in relevant programming language.

solutions.

- 3.2 Problems and bugs in program are rectified to ensure compliance with program performance requirements.
- 3.3 Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person(s).

Note:

- 1. Key features include that features classes, inheritance, polymorphism, arrays and packages.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and provide programming solution for engineering problems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.44.2 High level programming
- 2.4.44.3 Advanced high level programming
- 2.10.1.2 Electronic signals and systems
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to providing programming solution for engineering problems in any high level programming language used in engineering applications.

Note:

Example of programming languages are 'C', and object oriented languages such as 'C++', Java and Visual Basic.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified

in the Performance Criteria and range statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide programming solution for engineering problems as described in 7) and including:
    - A Understanding the engineering programming problem.
    - B Using all key features of programming language.
    - C Developing testing procedures.
    - D Identifying problem and bugs in code.
    - E Rectifying problem and bugs in code.
    - F Writing intermediate and final work reports in accordance with professional standards.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing programming solution for engineering problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.1	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.6	2
How are mathematical ideas	Refer to the following Performance Criteria for examples of application:	

and techniques used?	2.2 to 2.6	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.2	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 2.2 to 2.6; 3.1
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-	Refer to the following Performance Criteria for examples of application:

routine or contingent situations	2.5; 3.1; 3.2
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## UEENEED052A Design embedded controller systems

### Unit Descriptor

1)

This unit covers designing systems incorporating microcontrollers or embedded signal processors (DSPs). It encompasses working safely, following design briefs and applying knowledge of embedded system devices, interpreting device specifications, constructing prototypes, using appropriate development software, applying programming techniques, testing developed system prototype operation and documenting design and development work.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEEE027A Use advanced computational processes to provide solutions to engineering problems

UEENEED027A Develop structured programs for control sub systems to access external devices

UEENEED028A Develop and test basic specification for microcontroller equipped devices

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

**Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field**

**4)**

Computer Systems

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .

1 Prepare to design and develop advance embedded systems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the proposed embedded system development is determined from the design brief or in consultation with appropriate person(s).
- 1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.
- 1.5 Materials and devices/components required for the work are selected on compatibility of their specifications with embedded system requirements and project budget constraints.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Design and develop advance embedded systems.

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 Knowledge of embedded devices and systems and compliance standards are applied to the design.
- 2.3 Alternative arrangements for the design are considered based on the requirements outlined in the design brief.
- 2.4 Safety, functional and budget considerations are incorporated in the design.

- |   |  |  |
|---|--|--|
|   | 2.5  | Prototype devices and circuits are constructed and tested for compliance with the design brief and regulatory requirements. (Note) |
|   | 2.6  | Prototype malfunctions are rectified and retested to ensure effective operation of design.   |
|   | 2.7  | Embedded system design is documented for submission to appropriate person(s) for approval.   |
|   | 2.8  | Solutions to unplanned situation are provided consistent with organisation policy.   |
| 3 | Obtain approval for embedded systems design. |  |
|   | 3.1  | Embedded system design is presented and explained to client representative and/or other relevant person(s).                        |
|   | 3.2  | Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation policy.       |
|   | 3.3  | Final design is documented and approval obtained from appropriate person(s).   |
|   | 3.4  | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.   |

Note.

Prototype construction includes programming some devices.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing embedded controller systems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.3.3   | Process control principles                |
| 2.9.4.2 | Digital signal processing                 |
| 2.9.4.3 | Digital signal processing development     |
| 2.18.1  | Occupational Health and Safety principles |
| 2.18.9  | Electronic Safe working practices         |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing and developing an embedded system with at least five interacting functions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design embedded controller systems as described in 7) and including:
    - A Developing outlines of alternative designs.
    - B Developing the design within the safety and functional requirements and budget limitations.
    - C Documenting and presenting design effectively.
    - D Successfully negotiating design alteration requests.
    - E Obtaining approval for final design.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in design embedded controller systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- |             |   |
|-------------|---|
| UEENEEE027A | Use advanced computational processes to provide solutions to engineering problems |
| UEENEED027A | Develop structured programs for control sub systems to access external devices    |
| UEENEED028A | Develop and test basic specification for microcontroller equipped devices         |

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

## Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.3; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 2.5; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	3

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 2.3; 3.3; 3.4;
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.7; 3.1 to 3.3;
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## **UEENEED053A Set up and test biometric devices**

### **Unit Descriptor**

1)

This unit covers setting up and testing various biometric devices as implemented in the field of biometric measurements. This is achieved through the installing, setting up, configuring and testing biometric devices in accordance with requirements. It encompasses safe working practices, following written and oral instructions and procedures, applying knowledge of biometric devices then installing and testing their performance while documenting outcomes.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEED046A Set Up and Configure a Basic Local Area Network

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

### **ELEMENT**

### **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to set up and test biometrics devices	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of device set up and configuration work is determined from job specifications and in consultation with appropriate person(s).</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.5 Hardware, software and materials needed for the work are obtained in accordance with established procedures and checked against job requirements.</p> <p>1.6 Tools and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Set up and test biometric devices	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Circuits/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.3 Layout of biometric system network hardware, cabling and outlets is determined from job specifications or in consultation with appropriate person(s)</p> <p>2.4 Hardware is set up in accordance with network requirements (See Note 1)</p> <p>2.5 Biometric devices are set up and configured in accordance with network requirements.</p> <p>2.6 Biometric devices on a network are tested and anomalies identified and corrected.</p> <p>2.7 Biometric device failures are responded to and rectified in accordance with requirements.</p>

- |   |                                   |   |
|---|-----------------------------------|---|
|   | 2.8                               | Essential knowledge and associated skills required to set up and test biometric devices are applied to ensure work is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
|   | 2.9                               | Identified causes of reported problems are rectified and biometric devices are tested in accordance with established procedures.  |
|   | 2.10                              | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   | 2.11                              | Biometric device installation and set-up are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.  |
| 3 | Complete set up, test and report. | 3.1 OHS risk control work completion measures and procedures are followed.  |
|   |                                   | 3.2 Work area is cleaned and made safe in accordance with established procedures.   |
|   |                                   | 3.3 Biometric device installation and maintenance records are maintained in accordance with established procedures.   |
|   |                                   | 3.4 Service report is completed and forwarded to appropriate person(s) in accordance with established procedures.   |

Note 1:

Connection of equipment may include both plug connected power supply and network

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and setting up and testing biometric devices. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.9.71.1 | Biometric devices                         |
| 2.18.1   | Occupational Health and Safety principles |
| 2.18.9   | Electronic Safe working practices         |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to setting up and testing four different types of biometric device.

Note.

Examples of biometric devices are iris recognition scanners, palm print scanners, signature readers, voice recognition devices, data capture devices .

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety

and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up and test biometric devices as described in 7) and including:
    - A Placing equipment in accordance with regulatory and customer requirements.
    - B Applying knowledge of relevant legislation, standards and/or codes of practice pertaining to security and privacy associated with biometric devices
    - C Selecting appropriate equipment.
    - D Entering functions and parameters in accordance with requirements.

- E Testing and verifying functional operation of device(s).
- F Responding to system anomalies to effect functionality of device(s) according to requirements.
- G Completing necessary documentation including handing over equipment maintenance and operating instructions documents to the customer.
- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up and testing biometric devices.

### **Method of assessment**

#### **8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

### **Concurrent assessment and relationship with other units**

#### **8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of Occupational Health and Safety covered in Unit UEENEE001A and other discipline specific Occupational Health and Safety unit(s) shall be reassessed in relation to this unit.

**Key competencies 8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3, 2.2, 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2, 2.6, 3.1	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3; 2.6, 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; to 2.9	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1., 1.4, 2.2, 2.4	

**Skills7 Enabling 8.7)**

**Employment**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2 to 2.9; 3.1
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6 to 2.9

## UEENEED054A Analyse and implement biometric techniques and applications

### Unit Descriptor

1)

This unit covers analysing and implementing the various established biometric techniques and applications as implemented in the field of biometric measurements. This is achieved through evaluation of the major biometric system from enrolment phase, interaction with the operator and subject, to decision making. It encompasses safe working practices, following written and oral instructions and procedures, applying knowledge of biometric systems then implementing, testing and evaluating their performance while documenting outcomes.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed only after the following competencies have been confirmed.

UEENEED053A Develop and Validate Biometric Systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

### ELEMENT

### PERFORMANCE CRITERIA

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .</p>
<p><b>1 Prepare to analyse and implement biometric techniques and applications.</b></p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Consideration is given to technical factors that will have an impact on the design and system rollout in criminal, civil and commercial settings.</p> <p>1.4 Technical and physical requirements of a biometric system required for efficient implementation and system rollout are identified</p> <p>1.5 Existing and planned technical and environmental goals of the enterprise are evaluated and documented.</p> <p>1.6 Work team/group is arranged of appropriately competent persons in accordance with skills required to meet work outcomes and organisation’s established procedures.</p> <p>1.7 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.8 Correct operation and safety of software, tools, equipment, and testing devices needed to carry out the work are obtained and checked in accord requirements.</p> <p>1.9 Work supervisor or customers are consulted to determine which functions of the system are to be used and the parameters of each and seek written confirmation.</p>
<p><b>2 Analyse and implement biometric techniques and applications</b></p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of technology and the processes of implementation used with biometric systems are applied in analysing and implementing biometric techniques and applications according to requirements.</p>

- 2.3 Performance of landline versus mobile telephony in association with biometric systems is analysed.
- Note:  
Analysis and evaluation to incorporate development process, target enrolment, identification and verification, system installation requirements, software, equipment requirements and instructions for the biometric system.
- 2.4 Safety, functional and budgetary considerations are incorporated in the installation design plan analysis and evaluation.
- 2.5 Hardware and software required for the biometric system are analysed and implemented in accordance with the developed plan and established procedures.
- 2.6 Australian and International standards and/or codes of practice are used to evaluate compliance.
- 2.7 Practical aspects and limitations of biometric system implementation are demonstrated through the use of multi-biometrics.
- 2.8 Location of each device in the installation of the biometric system to ensure correct operation of system functions is documented.
- 2.9 Solutions to unplanned situation are provided that are consistent with legal requirements and established procedures.
- 3 Report on biometric system analysis and implementation
- 3.1 Hardware and software required for the biometric system are analysed for compliance requirements and in accordance with OHS requirements and established procedures
- 3.2 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 3.3 Possible system malfunctions are identified during system analysis and implementation using logical techniques drawing on knowledge of biometric systems.
- 3.4 Approaches to issues/problems are analysed to provide most effective solutions.
- 3.5 Work completion is documented and notified appropriate person(s) or persons in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and analysing and implementing biometric techniques and applications for in field use.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.71.2 Biometrics Equipment Techniques and Applications
- 2.9.71.3 Biometric Systems Techniques and Applications
- 2.18.1 Occupational Health and Safety Principles
- 2.18.9 Electronic Safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to analysing and implementing a biometric system, including at least two of the following features:

- analysis and evaluation development process
- target enrolment
- identification and verification
- system installation requirements
- software
- equipment requirements and instructions

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range

statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Evaluation through analysis and implementation of Biometric Systems as described in 7) and including:
    - A Evaluating fingerprint matching, palm print analysis, hand geometry investigation, facial verification, iris recognition, retinal scan, voice recognition, speaker verification, handwriting analysis, signature verification, DNA technology techniques and applications for in field of biometric use
    - B Implementing advice of fingerprint matching, palm print analysis, hand geometry investigation, facial verification, iris recognition, retinal scan, voice recognition, speaker verification, handwriting analysis, signature verification, DNA technology techniques and applications for in field of biometric use
    - C Any two of the following features:
      - analysis and evaluation development process
      - target enrolment
      - identification and verification
      - system installation requirements
      - software requirements
      - equipment requirements and instructions
    - D Applying knowledge of relevant legislation, standards and/or codes of practice pertaining to security and privacy associated with biometric system techniques and applications
    - E Documenting and recording results in accordance with requirements
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and**

**8.3)**

**specific resources for assessment**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in analysing and implementing a biometric system for in field use.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED053A Develop and Validate Biometric Systems

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 2.6; 2.7; 3.7	3

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.6; 2.7	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3; to 1.6; 2.1 to 2.3; 2.6; 3.4; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3; 3.1 to 3.5	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.7; 3.7
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5

## **UEENEED055A    Develop and validate biometric systems installation**

### **Unit Descriptor**

1)

This unit covers the development of biometric system installation, instructions and validating requirements of biometric systems. It encompasses working safely, understanding operating parameters and capabilities, following instructions and while documenting outcomes.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be only after all relevant competency standard units at AQF level 5 or higher have been achieved.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide .
1 Prepare to develop and validate biometric systems installation and related instructions and validation	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Consideration is given to technical factors that will have an impact on the system installation in criminal, civil, and commercial settings.</p> <p>1.4 The extent of the biometric database is identified and evaluated, including factors affecting the integration and application of proprietary or open source packages.</p> <p>1.5 Evaluate for documenting the existing and planned technical and environmental requirements, including the enterprise.</p> <p>1.6 Work team/group is arranged of appropriately competent persons in accordance with skills required to meet work outcomes and organisation’s established procedures.</p> <p>1.7 The business requirements of the enterprise taking into account, existing and projected business model, organisational and information technology management structures and legal aspects of biometrics in Australia and overseas environments are analysed.</p> <p>1.8 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.9 Correct operation and safety of software, tools, equipment and testing devices needed to carry out the work are obtained and checked in accord requirements.</p> <p>1.10 Work supervisor or customers are consulted to determine which functions of the system are to be used and the parameters of each, and written confirmation sought.</p>
2 Develop and validate biometric systems installation and related	2.1 OHS risk control measures and procedures for carrying out the work are followed.

instructions and validation	2.2	Knowledge of technology of biometric systems, information technology, network security and other services, installation performance standards, compliance methods and service equipment when developing the biometric system are applied in accordance with requirements.
	2.3	Development process for installation, equipment, instructions, and validation requirements of the biometric system are evaluated.
	2.4	Safety, functional and budgetary considerations are incorporated in the installation plan analysis and evaluation.
	2.5	Equipment required for the biometric system are validated in accordance with the developed plan and established procedures.
	2.6	Australian and International standards and/or codes of practice are used to evaluate compliance.
	2.7	Required status and parameters of each function of system devices are entered and set in accordance established procedures, manufacturer instructions and customer’s requirements.
	2.8	Location of each device in the installation of the biometric system to ensure correct operation of system functions is documented.
	2.9	Solutions to unplanned situation are provided that are consistent with legal requirements and established procedures.
	3 Validate and report on biometric systems installation and related instructions and validation	3.1
3.2		Operating anomalies are identified and reported in accordance with established routines.
3.3		Possible system malfunctions are identified during compliance testing using logical techniques drawing on knowledge of biometric systems.
3.4		Approaches to solving issues/problems are analysed to provide most effective solutions.
3.5		Work completion is documented and notified appropriate person(s) or persons in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing biometric system installation, instructions and validating requirements of biometric systems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.71.2	Biometrics Equipment Techniques and Applications
2.9.71.3	Biometric Systems Techniques and Applications
2.9.71.4	Biometrics and Security
2.18.1	Occupational Health and Safety Principles
2.18.9	Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing biometric system installation, instructions and validating requirements of biometric systems., including at least two of the following features:

- securing computer networks
- data base design
- measurement of a biometric system
- equipment requirements and instructions

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment,

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and range statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and range statement
  - Demonstrate an understanding of the essential knowledge and

associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Evaluation through developing biometric system installation, instructions and validating requirements of biometric systems as described in 7) and including:
    - A Evaluating operating functions and parameters
    - B Selecting appropriate equipment.
    - C Any two of the following features:
      - securing computer networks
      - data base design
      - measurement of a biometric system
      - equipment requirements and instructions
    - D Entering functions and parameters correctly.
    - E Testing and verify system operation.
    - F Correcting system anomalies effectively.
    - G Applying knowledge of relevant legislation, standards and/or codes of practice pertaining to security and privacy associated with biometric system techniques and applications
    - H Documenting and recording results in accordance with requirements
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing biometric system installation, instructions and validating requirements of biometric systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 2.6; 2.7; 3.7	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.4	3
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.6; 2.7	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3; to 1.6; 2.1 to 2.3; 2.6; 3.4; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3; 3.1 to 3.5	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 2.7; 3.7
4	Interacting and understanding of	Refer to the following Performance Criteria for examples of application:

	the context of the work task	1.3; 2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1E  
E – Cross Discipline Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## UEENEEE001A Apply OHS practices in the workplace

### Unit Descriptor 1)

This unit specifies the mandatory requirements of Occupational Health and Safety and how they apply to the various electrotechnology work functions. It encompasses responsibilities for health and safety, risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Note:

Components of this unit are included in the critical aspects of evidence of each applicable unit to ensure that OHS practices are demonstrated as they apply to specific work functions and situation.

### Prerequisite Unit(s) 2)

### Competencies 2.1)

There are no prerequisite competencies for this unit.

Note:

1. Competency in this unit shall be assessed concurrently with other units in a qualification.
2. Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

### Literacy and numeracy skills 2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit 3)

This unit addresses information, processes and techniques for the application of general Occupational Health and Safety requirements in workplaces and is essential for employees without managerial or supervisory responsibilities. The unit is based on Generic Competency A in the National Guidelines for Integrating OHS Competencies into National Industry Competency Standards [NOHSC: 7025 (1998) 2nd Edition].

Note: All States/Territories and the Commonwealth have enacted legislation that establishes a general duty of care for workplace parties to ensure healthy and safe working conditions. In most workplaces, the final responsibility for providing a healthy and safe working environment, as far as practicable, rests with the employer. Employees also have a duty of care in relation to OHS that ensures their health and safety and that of others in the workplace. The relevant jurisdictional OHS legislation should always be consulted to ascertain the exact duties set down for employers and employees.

**Licence to practise 3.1)**

The competency described in this unit does not directly require a licence to practise but is subject to regulations for Occupational Health and Safety and contracts of training where they apply.

Note

Some workplace equipment requires an operative to hold a current user permit eg scaffolding and elevated platforms above certain heights, excavation equipment. Competencies for receipt of such permits are not included in this unit.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1	Prepare to enter a work area	1.1	Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained.
		1.2	Work area access permits are obtained from appropriate personnel according to established procedures.
		1.3.	Preparations for electrical and non-electrical isolation are carried out to prevent creation of hazards from loss of machine/system/process control according to established procedures.
		1.4	Tools and equipment needed for the work are checked for safety and correct functionality according to established procedures and regulatory requirements.
2	Apply safe working practices	2.1	Workplace procedures and work instructions for controlling risk are followed accurately.
		2.2	Workplace procedures for dealing with accidents, fires and emergencies are followed according to work procedures and scope of responsibility and competencies.
3.	Follow workplace procedures for hazard identification and risk control	3.1	Hazards are identified and control measures implemented and monitored through active participation in the consultation process with employer and other employees.

- 3.2 Hazards in the work area are recognised and reported to appropriate personnel according to established procedures.
- 3.3 OHS records of incidents are completed in accordance with regulatory requirements and established procedures.
- 3.4 Workplace instructions and training are followed accurately within established procedures.

## **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying OHS practices in the workplace.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

### 2.18.1 Occupational Health and Safety principles

## **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- (a) Relevant Occupational Health and Safety legislation, regulations and codes of practice related to hazards present in the industry and particular workplace
- (b) Accepted industry work procedures and the specific safety procedures and work instructions for particular workplace.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement encompassing:
  - A Preparing to enter the workplace including, the use of work permits and clearances and isolation permissions.
  - B Applying work procedures and instructions as they apply to risk control measures.
  - C Dealing with accidents and emergencies within the scope of responsibility.
  - D Participation in consultation processes, identifying hazards and implementing and monitoring control measures.
  - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items, and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit so that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Applying OHS practices in the workplace as described in 7) and including:

Note:

Ability to implement these Occupation Health and Safety measures shall be demonstrated on all occasions safety issues arise.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in applying OHS practices in the workplace.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

This unit shall be assessed concurrently, as it relates to other units undertaken in a possible skill clusters or qualification.

Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 2.1; 3.3	1
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.3; 1.4	
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  3.1	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 3.4
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1; 3.2
4	Interacting and understanding of	Refer to the following Performance Criteria for examples of application:

	the context of the work task	2.1; 2.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.2

## UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers basic fitting and fabrication techniques as they apply in the various electrotechnology work functions. It encompasses the safe use of hand, fixed and portable power tools; cutting, shaping joining and fixing using metallic and non-metallic materials; dismantling and assembling equipment; basic mechanical measurement and marking-out and reading diagrams.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Electrotechnology</p>						

ELEMENT	PERFORMANCE CRITERIA
<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare for dismantling, assembling and fabrication work.</p>	<p>1.1 OHS procedures for a given work area are obtained and understood through established routines and procedures.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Safety hazard not previously identified are reported and advice on risk control measures is sought from the work supervisor.</p> <p>1.4 The nature of the work is obtained from documentation and from work supervisor to establish the scope of work to be undertaken.</p> <p>1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.6 Materials required for the work are obtained in accordance with established routines and procedures.</p> <p>1.7 Tools, equipment and measuring devices needed to carry out the work are obtained and checked for correct operation and safety.</p> <p>1.8 Cutting tools such as drills and chisels are sharpened to suit the material on which they are to be used.</p>
<p>2 Dismantle and assemble electrotechnology apparatus.</p>	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.3 Appropriate tools are selected and used correctly and safely in dismantling and assembling apparatus.</p> <p>2.4 Manufacturer apparatus dismantling and assembling guides are used where applicable.</p> <p>2.5 Components are marked or tagged during the dismantling to help ensure correct and efficient reassembly.</p>

- 2.6 Dismantled components and parts are stored to protect them against loss or damage.
- 2.7 Apparatus is dismantled and assembled efficiently without waste of materials and energy and/or damage to apparatus and the surrounding environment or services.
- 2.8 Procedures for referring non-routine events to immediate supervisor for directions are followed.
- 2.9 Routine quality checks are carried out in accordance with work instructions.
- 3 Fabricate electrotechnology components.
  - 3.1 Established OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 3.3 Appropriate tools are selected and used correctly and safely in fabricating components.
  - 3.4 Drawings and instruction for the fabrication of components are followed.
  - 3.5 Component dimensions are determined directly or by calculation from information given in job drawings and instructions.
  - 3.6 Components are fabricated efficiently without waste of materials and energy and/or damage to the surrounding environment or services.
  - 3.7 Procedures for referring non-routine events to immediate supervisor for directions are followed.
  - 3.8 Routine quality checks are carried out in accordance with work instructions.
- 4 Complete work and report.
  - 4.1 OHS risk control work completion measures and procedures are followed.
  - 4.2 Work site is cleaned and made safe in accordance with established procedures.
  - 4.3 Work supervisor is notified of the completion of the work in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and dismantling, assembling and fabricating electrotechnology components.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.11.1 Hand tools

2.11.2.1 Power tools

2.11.4 Dismantling and assembling techniques

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Dismantle, assemble and fabricate electrotechnology components as described in 7) and including:
    - A Dismantle and assemble an apparatus relevant to the discipline in which competency is sought and that requires selection and safe use of a variety dismantling/assembling tools.
    - B Sharpening a drill bit for at least two different types of material.
    - C Fabricating a component that requires the selection and safe use of a variety of fabrication tools.
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and  
specific  
resources for  
assessment**
**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in dismantling, assembling and fabricating electrotechnology components.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE005A    Fix and secure equipment

UEENEEE007A    Use drawings, diagrams, schedules and manuals

The critical aspects of Occupational Health and Safety covered in UEENEEE001A and other discipline specific Occupational Health and Safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.3	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4; 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 3.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3; 3.3	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.1

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8; 3.7

## UEENEEE003A Solve problems in extra-low voltage single path circuits

### Unit Descriptor

1)

This unit covers providing known solutions to predictable problems in single path circuits operated at extra-low voltage as they apply to various electrotechnology work functions. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable circuit problems.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However they are subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.

### Competency Field

4)

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to work on extra-low voltage single path electrical circuits.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 OHS risk control work preparation measures and procedures are followed.</p> <p>1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Solve problem in extra-low voltage single path electrical circuits.	<p>2.1 OHS risk control work measures and procedures are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.4 Established routines are used to solve circuit problems using measured and calculated values as they apply to single path, single source circuits.</p> <p>2.5 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.</p>

3	Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Justification for solutions used to solve circuit problems is documented.
		3.4	Work completion is documented and appropriate person(s) notified in accordance with established routine procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in extra-low voltage single path circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.1.2 Fundamental electrical principles

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Single source single path circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:
  - Computers
  - Data Communications
  - Electrical
  - Electronics
  - Fire protection
  - Instrumentation
  - Refrigeration and Air Conditioning,
  - Renewable and sustainable energy systems, and
  - Security technology

- In relation to at least three of the following types of circuit problems and on at least two occasions:
  - Determining the operating parameters of an existing circuit
  - Identifying and locating open-circuits
  - Identifying and locating short-circuits
  - Identifying loss of supply

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in extra-low voltage single path circuits as described in 7) and including:
    - A Determining the operating parameters of an existing circuit.
    - B Altering an existing circuit to comply with specified operating parameters.
    - C Developing circuits to comply with a specified function and operating parameters.
    - D Identifying loss of supply.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solve problems in extra-low voltage single path circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of Occupational Health and Safety covered in UEENEEE001A and other discipline specific Occupational Health and Safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.1	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:

		All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEE004A Solve problems in multiple path d.c. circuits

### Unit Descriptor

1)

This unit covers determining correct operation of single source d.c. parallel and series-parallel circuits and providing solutions as they apply to various electrotechnology work functions. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in multiple path circuit.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been acquired.

UEENEEE003A Solve problems in extra-low voltage single path circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit requires a licence to practise in the workplace where plant and equipment is directly connected to installation wiring that operates at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to work on multiple path d.c. electrical circuits.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve multiple path d.c. circuit problems.

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Established methods are used to solve d.c. circuit problems from measure and calculated values as they apply to multiple path electrical circuit.
- 2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.

- |   |  |     |   |
|---|--|-----|---|
| 3 | Complete work and document problem solving activities. | 3.1 | OHS work completion risk control measures and procedures are followed.                                      |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.                               |
|   |  | 3.3 | Justification for solutions used to solve circuit problems is documented.                                   |
|   |  | 3.4 | Work completion is documented and appropriate person(s) notified in accordance with established procedures. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in multiple path d.c. circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.2.1 Direct current circuit principles

2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- - Single source parallel and series-parallel d.c. circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:
    - Computers
    - Data Communications
    - Electrical
    - Electronics
    - Fire protection
    - Instrumentation
    - Refrigeration and Air Conditioning, and
- - In relation to at least two of the following types of circuit problems and on at least two occasions:
    - Determining the operating parameters of an existing circuit
    - Alternating an existing circuit to comply with specified operating parameters

- Developing circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solving problems in multiple path d.c. circuits as described in 7) and including:
    - A Determining the operating parameters of an existing circuit.
    - B Alternating an existing circuit to comply with specified operating parameters.
    - C Developing circuits to comply with a specified function and operating parameters.
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in multiple path d.c. circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of Occupational Health and Safety covered in UEENEEE001A and other discipline specific Occupational Health and Safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEE005A Fix and secure equipment

### Unit Descriptor

1)

This unit covers fixing, securing and mounting techniques as apply in the various electrotechnology work functions. It encompasses the safe use of hand and portable power tools, safe lifting techniques, safe use of ladders and elevated platforms and the selection and safe application of fixing devices and supporting accessories/equipment.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisites to this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.

### Licence to practise

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace where they are applied to electrical work intended for voltage above 50 V a.c. or 120 V d.c. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

#### Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

### Competency Field

4)

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to fix and secure equipment.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 OHS risk control work preparation measures and procedures are followed.</p> <p>1.3 The scope of work to be undertaken is obtained from documentation or from work supervisor.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.</p> <p>1.6 Fixing devices are selected for their suitable ability for the environment, the load they are to support and substratum's into which they are to be installed.</p> <p>1.7 Supporting accessories/equipment is selected for suitability for the environment and ability to support and protect from damage that which they are intended to support.</p> <p>1.8 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Install fixing and support devices.	<p>2.1 Electrical isolation is arranged where work is within arms reach of exposed conductive parts, plant or machinery in strict accordance OHS requirements and procedures.</p> <p>2.2 Other OHS risk control measures relevant to the work site are followed.</p> <p>2.3 Fixing devices are installed in accordance with manufacturer instructions.</p> <p>2.4 Support accessories/equipment is install accurately and to comply with technical standards and job specifications.</p>

	2.5	Work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
3	Complete fixing and support work.	3.1 OHS risk control work completion measures and procedures are followed.
	3.2	Work site is tidied and tools and equipment cleaned and securely stored.
	3.3	Appropriate personnel are notified of the work completion.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and fixing and securing equipment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.11.1	Hand tools
2.11.2.1	Power tools
2.11.3.1	Fixing and support devices and techniques
2.18.1	Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation

- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Fix and secure equipment as described in 7) and including:
    - A Selecting fixing for loads of < 5 kg, < 20 kg and < 50 kg and suitable for the environment in which they are to be installed.
    - B Fixing to a hollow wall, brick, concrete and steel.
    - C Fixing support accessories/equipment relevant the discipline in which competency is sought.
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in fixing and securing equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering other installation competencies.

The critical aspects of Occupational Health and Safety covered in UEENEEE001A and other discipline specific Occupational Health and Safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	1.7; 1.8; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEE006A      Apply methods to maintain currency of industry developments**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers methods for keeping up-to-date with developments in electrotechnology-adopted technologies, standards and safety that affect the currency of competencies held. It encompasses accessing relevant information and skills and using formal and informal ways of acquiring this information and skills.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite competencies for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended to augment other competency standard units and is suitable for programs independent of a qualification.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Electrotechnology</p>						

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1	Prepare to apply methods to maintain currency of industry developments	1.1	Areas of work activity that may be effected by outdated methods and knowledge are identified.
		1.2	Information and advice is sought on the effects of current legislated requirements on work outcomes.
		1.3	Sources of information related to technical and regulatory developments are investigated.
2	Apply methods to maintain currency of industry developments	2.1	Methods are used to ensure that the application of OHS policies complies with current regulations, codes and practices.
		2.2	Methods are used to ensure technical aspects of work undertaken are aligned to current practices and comply with current regulations.
		2.3	Methods are used to ensure managerial aspects of work undertaken are aligned to current practices and comply with current regulations.
		2.4	Formally recognised methods for maintaining currency of industry developments are identified and applied.
		2.5	Maintenance of current knowledge and practices for the work undertaken is documented in accordance with formally recognised processes.

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying methods to maintain currency of industry developments.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.44 Requirements and methods for maintaining currency in industry developments
- 2.18.1 Occupational Health and Safety principles

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to applying methods to maintain currency of industry developments in any electrotechnology discipline in which work is undertaken.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training

Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Apply methods to maintain currency of industry developments in 7) and including:
    - A Identifying areas of work effected by outdated methods and knowledge.
    - B Using methods to ensure current OHS practices are applied.
    - C Using methods to ensure technical aspects of work are aligned to current practices and comply with current regulations.
    - D Using methods to ensure managerial aspects of work undertaken are aligned to current practices and comply with current regulations.
    - E Applying formally recognised methods to maintain currency of industry developments.

- F Documenting maintenance of current knowledge and practices for the work undertaken appropriately.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in applying methods to maintain currency of industry developments.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE018A Establish, maintain and evaluate OHS systems

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.5	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
1 Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  All
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEE007A Use drawings, diagrams, schedules and manuals

### Unit Descriptor

1)

This unit covers the use of drawings, diagrams, equipment and cable schedules and manuals as they apply to the various electrotechnology work functions. It encompasses the rudiments for communicating with schematic, wiring and mechanical diagrams and equipment and cable/connection schedules, manuals, site and architectural drawings and plans showing the location of services, apparatus, plant and machinery.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to use drawings, diagrams, schedules and manuals.	<p>1.1 Established OHS risk control measures and procedures are followed.</p> <p>1.2 The need for drawings, diagrams, schedules or manuals is determined from the nature of the work to be undertaken.</p> <p>1.3 Established routines and procedures are followed to obtain drawings, diagrams, schedules or manuals required for the work to be undertaken.</p>
2 Use drawings, diagrams, schedules and manuals to obtain job information.	<p>2.1 Drawings, diagrams, schedules and/or manuals are selected, appropriate to the work being undertaken.</p> <p>2.2 Drawings, diagrams and schedules are interpreted using knowledge of drawing layouts, conventions and symbols.</p> <p>2.3 Dimensions are extracted from drawings and diagrams for application to work undertaken.</p> <p>2.4 Location of equipment is determined from equipment schedules and location diagrams.</p> <p>2.5 Manuals are reviewed to ascertain their format and where information relevant to the work to be undertaken is located.</p> <p>2.6 Information given in manuals is interpreted in relation to the work to be undertaken.</p>
3 Use drawings, diagrams, schedules and manuals to convey information and ideas.	<p>3.1 Drawing conventions are used in neat freehand drawings to convey information and ideas to others involved in the work to be undertaken.</p> <p>3.2 Drawing conventions are used to neatly correct freehand original job drawing to show final ‘as-installed’ arrangement.</p> <p>3.3 Corrected drawings are forwarded to appropriate person(s) in accordance with established procedures.</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and using drawings, diagrams, schedules and manuals.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.1.2 Drawings and diagrams

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to assembly, installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Use drawings, diagrams, schedules and manuals as described in Clause 7) Range and including:
    - A Identifying drawings, diagrams, schedules and manuals relevant to the work to be undertaken.
    - B Interpreting drawings, diagrams, schedules and manuals correctly.
    - C Using correct conventions in freehand drawings.
    - D Giving correct information in freehand drawings.
    - E Dealing with unplanned events and drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and**

**8.3)**

**specific resources for assessment**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in using drawings, diagrams, schedules and manuals.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the use of drawings, diagrams, schedules or manuals is required.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3	2

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.2	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 3.1	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.1	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.2; 2.1; 3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.2; 2.2 to 2.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: N/A

## **UEENEEE008A Lay wiring/cabling and terminate accessories for extra-low voltage circuits**

### **Unit Descriptor**

**1)**

This unit covers the laying of wiring/cabling, connection of accessories and continuity and insulation resistance testing of circuits intended to operate at extra-low voltage. Typically this includes circuits and accessories for ELV powered devices, security, controls, integrated systems, audio/video systems. It encompasses the principles of single source, single load power circuits, control circuits and communications circuits, safe working practices and following work processes that satisfy electrical principles for safety and functionality.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit may be assessed with or only after the following competency has been acquired.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, diagrams, schedules and manuals

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable

contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

**Competency Field 4)**

Electrotechnology

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to lay wiring/cabbling and connect accessories for extra-low voltage circuits.

- 1.1 OHS procedures for a given work area are obtained and understood through established routines.
- 1.2 Established OHS risk control measures in preparation for the work are followed.
- 1.3 Safety hazards not previously identified are reported and advice on risk control measures is sought from the work supervisor.
- 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor or other appropriate person to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established routines.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Lay wiring/cabbling and connect accessories for extra-low voltage circuits.

- 2.1 Established OHS risk control measures for carrying out the work are followed.
- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.3 Wiring and accessories are installed to comply standards and job specifications with sufficient excess to affect terminations.
- 2.4 Accessories are installed straight and square in the required locations and within acceptable tolerances.
- 2.5 Cables and conductors are terminated at accessories in accordance with manufacture’s specifications and regulatory requirements.
- 2.6 Cables installed for future service and marked in accordance with the cable identification scheme and terminated in compliance with regulatory requirements.
- 2.7 Procedures for referring non-routine events to immediate supervisor for directions are followed.
- 2.8 Cable installation and termination is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
- 3 Complete and report work activities.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Work supervisor is notified of the completion of the installation work in accordance with established routines.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and laying wiring/cabling and terminate accessories for extra-low voltage circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.1 Cable protection and support
- 2.1.2 Cable types and applications
- 2.1.3 Cables in buildings, structures and premises
- 2.1.4 Basic cable and conductor terminations
- 2.5.5 Technical standards, regulations and codes for extra-low voltage work

2.5.11 Environmental and heritage awareness

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to laying wiring/cabling and connecting accessories for extra-low voltage power and control cabling systems circuits using:

- At least one of the following wiring/cabling systems:
  - Unenclosed thermoplastic sheathed (TPS) cable
  - Enclosed thermoplastic insulated (TPI) or sheathed cables, and
- At least three of the following wiring/cabling systems:
  - single cable,
  - flexible cable,
  - flexible cord,
  - shielded cable,
  - armoured cable,
  - ribbon cable,
  - other similar and like cable

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in

some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Lay wiring/cabbling and terminate accessories for extra-low voltage in power and control circuits as described in 7) and including:
    - A Understanding the nature of the work.
    - B Selecting appropriate tools, cables and accessories.
    - C Following appropriate cable routes.
    - D Installing cable and accessories to requirements.
    - E Terminating cables and accessories to manufacture’s specifications and requirements.
    - F Cleaning worksite.
    - G Notifying completion of work using established procedures.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in laying wiring/cabbling and terminate accessories for extra-low voltage circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE002A Dismantle, assemble and fabricate electrotechnology components
- UEENEEE005A Fix and secure equipment
- UEENEEE007A Use drawings, diagrams, schedules and manuals

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.7	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5	1
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEEE009A Comply with scheduled and preventative maintenance program processes**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the quality assurance and risk management compliance processes for maintenance of the electrotechnology aspects of plant and equipment. It encompasses working safely and to technical, quality and risk management standards, work specifications and maintenance schedules, sample inspections, evaluating components and completing the necessary maintenance documentation.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed only after all core units have been achieved in the electrotechnology discipline qualification in which competency in the unit is sought.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit apply to any qualification in this standard at an AQF 3 level.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Where refrigeration and air conditioning are involved practice in the workplace is subject to Federal/State/Territory regulations covering the use of refrigerants and the relevant codes of practice; in some jurisdictions a licence is required.</p> <p>Practice in the workplace is also subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p>						

**Competency Field 4)**

Electrotechnology

**ELEMENT PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to comply with scheduled maintenance program processes.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Safety hazards which have not previously identified are noted and established risk control measures are implemented.</p> <p>1.4 The maintenance schedule and process compliance requirements are confirmed and work appropriately sequenced in accordance with established procedures.</p> <p>1.5 Appropriate person(s) are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.6 Location equipment to be maintained is determined from maintenance schedule procedures and/or system specifications and diagrams.</p> <p>1.7 Resources needed to conduct the maintenance is obtained in accordance with established procedures and checked against job requirements.</p> <p>1.8 Tools, equipment and testing devices needed to conduct the maintenance are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Comply with scheduled maintenance program processes.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Test or measure on a live and operating system in strict accordance with OHS requirements and within established safety procedures.</p> <p>2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p>

- 2.4 Apparatus to be maintained is inspected and evaluated for compliance with requirements in accordance with maintenance schedule.
  - 2.5 Non-compliant apparatus/components are documented and arrangements made for their rectification in accordance with established procedures.
  - 2.6 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
  - 2.7 Ongoing checks of the quality of the maintenance are undertaken in accordance with established procedures.
  - 2.8 Maintenance process compliance is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion of maintenance compliance processes.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site and equipment is cleaned and made safe in accordance with established procedures.
  - 3.3 Final checks are made to verify that the maintenance complies with requirements.
  - 3.4 Maintenance completion is documented and appropriate person(s) notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and complying with scheduled and preventative maintenance program processes.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.13.8 Scheduled maintenance processes

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to scheduled and preventative maintenance compliance processes of at least three different items of installed equipment in the any of the following electrotechnology disciplines.

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Lifts
- Mining, electrical
- Marine, electrical
- Refrigeration and Air Conditioning
- Uninterruptible power supplies (UPS)
- Stand alone generator sets
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range

Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Comply with scheduled and preventative maintenance program processes as described in 7) and including:
    - A Interpreting maintenance schedule requirements correctly.
    - B Following quality assurance and risk management compliance processes.
    - C Following maintenance schedule.
    - D Inspecting and evaluating apparatus for quality assurance and risk compliance.
    - E Arranging for corrective action of non compliant apparatus.
    - F Documenting maintenance work.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in complying with scheduled and preventative maintenance program processes.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 2.4; 2.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEE010A      Develop and implement maintenance programs**

### **Unit Descriptor**

1)

This unit covers the development of maintenance programs to ensure safe and continued operation of plant and equipment. It encompasses evaluating risks associated with equipment failure, development of failsafe strategies incorporating maintenance frequency, repair/overhaul/replacement policies, and development of record and reporting system.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed only after all core units have been achieved in the electrotechnology discipline in which competency in the unit is sought.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher. It may be used in employment-based programs incorporated in approved contracts of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Electrotechnology

## **ELEMENT**

## **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Establish maintenance requirements.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Policies and procedures are developed to include OHS practices, skills required and frequency and level of maintenance work.</p> <p>1.4 The extent of the maintenance program is determined from plant performance specifications and in consultation with relevant person(s).</p> <p>1.5 Appropriately competent persons are engaged to assess the risks associated with individual equipment failure.</p> <p>1.6 Level and frequency of repair/replace to be done under maintenance work is established from risk assessment reports and manufacture’s recommendations and standards reflecting acceptable exposure to risk of equipment failure.</p> <p>1.7 Systems are established to manage and record maintenance work in accordance with organisation and regulatory requirements.</p>
2 Develop and implement maintenance program.	<p>2.1 Schedules are developed detailing maintenance levels and frequency for all equipment items based risk assessment reports and manufacture’s recommendations.</p> <p>2.2 Procedures are developed and implemented to ensure the maintenance program is followed in accordance with the planned schedule and requirements.</p> <p>2.3 Procedures are developed and implemented to ensure records are maintained in accordance with planned schedule and requirements.</p> <p>2.4 Maintenance program is documented in accordance with in accordance with professional standards and organisation procedures.</p>
3 Evaluate maintenance program.	<p>3.1 Periodic and sample inspection reports are used to ascertain maintenance quality and the need for revision of maintenance schedule and frequency.</p>

- 3.2 Maintenance schedule is periodically reviewed and revised to maintain acceptable level of risk associated with equipment failure.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing and implementing maintenance programs.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.13.8 Scheduled maintenance processes
- 2.18.1 Occupational Health and Safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing and implement a maintenance program for a plant with at least 10 different types of items included in the schedule. Plant may be for production, process or building services.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in

some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop and implement maintenance programs as described in 7) and including:
    - A Determining the extent of the maintenance program accurately.
    - B Establishing the level and frequency of maintenance reflecting acceptable exposure to risk of equipment failure.
    - C Developing an effective maintenance schedule implementation procedures.
    - D Developing a maintenance record system.
    - E Developing Ongoing maintenance evaluation scheme.
    - F Documenting the maintenance program clearly.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing and implementing maintenance programs.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.1; 3.2	3

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.6 to 3.2	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 1.6; 3.1

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.7 to 3.2

## UEENEEE011A Manage risk in electrotechnology activities

<b>Unit Descriptor</b>	1)  This unit covers managing risk related to OHS, environment, resources and financial viability. It encompasses identifying risk events, the likelihood and consequences of such events, evaluating risk, risk management planning and mitigation of risk.
<b>Prerequisite Unit(s)</b>	2)
<b>Competencies</b>	2.1)  Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.
<b>Literacy and numeracy skills</b>	2.2)  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'  Reading      5      Writing      5      Numeracy      5
<b>Application of the Unit</b>	3)  This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.
<b>Licence to practise</b>	3.1)  The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.
<b>Competency Field</b>	4)  Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Identify risks and develop management strategies.	<p>1.1 OHS policies, processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 The extent of a program or project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).</p> <p>1.3 Potential, perceived and actual risk events are identified, documented and analysed, in consultation with risk professionals and appropriate other person(s) in accordance with organisation policies and procedures.</p> <p>1.4 Risk management methods, tools and techniques are used to assist in the analysis and reporting of identified risk events.</p> <p>1.5 Risk management techniques are used to analyse risk events, assess options and recommend risk approaches to appropriate person(s) for approval.</p> <p>1.6 Risk management processes and procedures are developed and agreed to by all stakeholders and communicated to ensure clarity of understanding and ongoing management of risk factors.</p> <p>1.7 OHS risk control measure are incorporated in the in the risk management strategies in compliance with organisation’s OHS policy and regulations.</p>
2 Implement and monitor risk management strategies.	<p>2.1 Risk management processes and procedures are incorporated into work and project plans to ensure common approach achieving outcomes.</p> <p>2.2 Activities are monitored against programs and projects plans to identify and respond to variations in accordance with risk management processes and procedures.</p> <p>2.3 Agreed risk responses are implemented and plans modified to reflect changing project objectives in an environment of uncertainty.</p>

- |   |                                      |     |  |
|---|--------------------------------------|-----|--|
| 3 | Evaluate risk management strategies. | 3.1 | Project outcomes are reviewed with appropriate person(s) to determine effectiveness of risk management processes and procedures.   |
|   |                                      | 3.2 | Risk issues and recommended improvements are identified, documented and passed to appropriate person(s) for approval to incorporate them into ongoing programs and future program and project and plans. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and managing risk in electrotechnology activities.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.2.15   | Risk management, application and techniques                 |
| 2.18.8.2 | Occupational Health and Safety, enterprise responsibilities |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in managing risk in relation to a program or an individual project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### Overview of Assessment

##### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to

include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Manage risk in electrotechnology activities as described in 7) and including:
    - A Contributing to identifying potential, perceived and actual risk events.
    - B Using risk management methods, tools and techniques to assist in the analysis and reporting.
    - C Incorporating risk management processes and procedures into program and project plans.
    - D Monitoring and responding risk events effectively.
    - E Identifying improvements and documenting recommendation for their inclusion in ongoing or future programs and projects.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in managing risk in electrotechnology activities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE012A    Manage electrotechnology projects

UEENEEE013A    Plan electrotechnology projects

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.6; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.5	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.2	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.5; 3.1	3
How are mathematical ideas	Refer to the following Performance Criteria for examples of application:	

and techniques used?	1.5; 2.3; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6; 2.3; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	3

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 3.1; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1; 1.2
6	Performing the work task in non-	Refer to the following Performance Criteria for examples of application:

	routine or contingent situations	2.3
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## UEENEEE012A Manage electrotechnology projects

### Unit Descriptor

1)

This unit covers the management of projects involving design, modifications, installation and or maintenance of systems and equipment. It encompasses management of safety, budget, variations, personnel, resources and critical path timelines and necessary progress and completion documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Identify risks and develop management strategies.	<p>1.1 OHS policies, processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 The extent of a program or project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).</p> <p>1.3 Potential, perceived and actual risk events are identified, documented and analysed, in consultation with risk professionals and appropriate other person(s) in accordance with organisation policies and procedures.</p> <p>1.4 Risk management methods, tools and techniques are used to assist in the analysis and reporting of identified risk events.</p> <p>1.5 Risk management techniques are used to analyse risk events, assess options and recommend risk approaches to appropriate person(s) for approval.</p> <p>1.6 Risk management processes and procedures are developed and agreed to by all stakeholders and communicated to ensure clarity of understanding and ongoing management of risk factors.</p> <p>1.7 OHS risk control measure are incorporated in the in the risk management strategies in compliance with organisation’s OHS policy and regulations.</p>
2 Implement and monitor risk management strategies.	<p>2.1 Risk management processes and procedures are incorporated into work and project plans to ensure common approach achieving outcomes.</p> <p>2.2 Activities are monitored against programs and projects plans to identify and respond to variations in accordance with risk management processes and procedures.</p> <p>2.3 Agreed risk responses are implemented and plans modified to reflect changing project objectives in an environment of uncertainty.</p>

- |   |                                      |     |  |
|---|--------------------------------------|-----|--|
| 3 | Evaluate risk management strategies. | 3.1 | Project outcomes are reviewed with appropriate person(s) to determine effectiveness of risk management processes and procedures.   |
|   |                                      | 3.2 | Risk issues and recommended improvements are identified, documented and passed to appropriate person(s) for approval to incorporate them into ongoing programs and future program and project and plans. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and managing electrotechnology projects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.2.17   | Project management  |
| 2.2.19   | Customer/Client relations                                   |
| 2.18.8.2 | Occupational Health and Safety, enterprise responsibilities |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in managing risk in relation to a program or an individual project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile

- graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
  - Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Manage electrotechnology projects as described in 7) and including:
      - A Establishing the scope of the project accurately.
      - B Ascertaining the input of a project.
      - C Developing effective management processes.
      - D Managing resources and variations effectively.
      - E Resolving conflicts.
      - F Adopting risk management strategies.
      - G Maintaining records and submitting progress reports.
      - H Meeting project outcomes.
      - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in managing electrotechnology projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.2 to 1.4: 2.6 to 2.8	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5	3

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  All	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  1.3; 2.5; 2.7; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.3; 2.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.3; 2.6	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.3; 2.7; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8; 3.1; 3.2;
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEE013A Plan electrotechnology projects

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers development and documentation of project proposals, milestones and completions. The unit encompasses, establishing budgets, critical path analysis, development of workflow strategies, documenting, presenting and negotiating budgets and timelines.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Electrotechnology</p>						

### ELEMENT

### PERFORMANCE CRITERIA

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to plan project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established techniques for project planning are reviewed are adopted in accordance with organisation policies.</p> <p>1.3 The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).</p>
2 Develop project plan proposal.	<p>2.1 Estimated plant, material, labour and other costs are sought and obtained from appropriate person(s) in accordance with organisation policies and procedures.</p> <p>2.2 Project budget is established from estimated plant, material, labour and other costs in accordance with organisation policies and procedures.</p> <p>2.3 Knowledge of critical path analysis is applied to developing workflow strategies.</p> <p>2.4 Sources and availability of materials and human resources needed for the project are established in accordance with organisation policies and procedures.</p> <p>2.5 Risk management strategies are sought and obtained for incorporating in the project plan.</p> <p>2.6 Project plan is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>2.7 Project plan proposal is documented in accordance with organisation policies and procedures.</p>
3 Obtain approval for project plan.	<p>3.1 Project plan is presented and discussed with person(s) of higher authority.</p> <p>3.2 Alterations to the project plan resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.</p> <p>3.3 Final project plan is documented and approval obtained from appropriate person(s).</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and planning electrotechnology projects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.2.16.1 | Project planning  |
| 2.2.18   | Critical path and project analysis                          |
| 2.18.8.2 | Occupational Health and Safety, enterprise responsibilities |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to planning any project incorporating any of the following electrotechnology disciplines and cost in excess of \$100k.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan electrotechnology projects as described in 7) and including:
    - A Determining the project requirements accurately.
    - B Establishing a project budget.
    - C Developing effective work flow strategies.
    - D Documenting project plan proposal.
    - E Negotiating alterations to the proposed project plan successfully.
    - F Obtaining approval of the final plan.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in planning electrotechnology projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 1.6; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2;
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.7 to 3.2

## UEENEEE014A Supervise and coordinate work activities

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the supervising and coordinating of work activities in an electrotechnology discipline. It encompasses working safety, implementing safety procedures and processes, sequencing work activities, providing guidance and work instructions to others, ensuring job requirements are met and maintain necessary work documentation.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after relevant technical units in a qualification have been achieved.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td>Reading</td> <td style="text-align: center;">4</td> <td>Writing</td> <td style="text-align: center;">4</td> <td>Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 4 level or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Electrotechnology</p>						

### ELEMENT

### PERFORMANCE CRITERIA

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to supervise and coordinate work activities	1.1 OHS processes and procedures for a given work area are identified, obtained and understood. 1.2 Job specification and requirements are obtained and understood. 1.3 Plant, materials and skills needed for the work are established from specifications and other relevant documentation. 1.4 Plant, materials, personnel and others needed for the work are accessed in accordance with established procedures.
2 Supervise and coordinate work activities.	2.1 OHS policies, procedures and programs are implemented and monitored. 2.2 Guidance and work instructions are given to appropriate personnel to ensure the various aspects of the work are sequenced and completed in accordance with job specifications and requirements. 2.3 Cooperation is sought from others involved in the work to ensure the various aspects of the work are coordinated effectively. 2.4 Work progress is monitored against schedules, job specifications and requirements. 2.5 Conflict issues at the work site are dealt with in accordance with established procedures. 2.6 Requested variations to job specification are dealt with in accordance with established procedures and processes. 2.7 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
3 Document supervision and coordination activities.	3.1 Job records are maintained in accordance with established procedures. 3.2 Processes are followed to ensure activities are carried out to established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and supervising and coordinating work activities.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.4	Problem solving techniques
2.2.6	Enterprise quality management system, basics
2.2.19	Customer/Client relations
2.2.41	Supervision fundamentals
2.18.8.2	Occupational Health and Safety, enterprise responsibilities

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to supervising and coordinating work activities any of the following electrotechnology disciplines.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects  
of evidence  
required to  
demonstrate  
competency in  
this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Supervise and coordinate work activities as described in 7) and including:
    - A Understanding job specification and requirements.
    - B Accessing appropriate plant, materials and personnel.
    - C Providing effective guidance and instructions to personnel.
    - D Obtaining the cooperation of others.
    - E Dealing with conflicts in accordance with established procedures.
    - F Dealing with job variations in accordance with established procedures.
    - G Ensuring work completion documentation is accurate and forwarded to appropriate persons.

- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in supervising and coordinating work activities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 3.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.2; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2;
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.7

## UEENEEE015A      **Develop design briefs for electrotechnology projects**

### **Unit Descriptor**

1)

This unit covers developing requirement to be incorporated in to the design of electrotechnology projects. It encompasses determining the safety requirements to be met, establishing client expectations, ensuring cost effective solutions are pursued and documenting design requirements.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed only after all core units have been achieved in the electrotechnology discipline in which competency in the unit is sought.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Electrotechnology

## **ELEMENT**

## **PERFORMANCE CRITERIA**

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>	
<p><b>1 Prepare to develop design briefs.</b></p>	<p>1.1</p> <p>1.2</p> <p>1.3</p> <p>1.4</p> <p>1.5</p>	<p>OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>Established techniques for project planning are reviewed are adopted in accordance with organisation policies.</p> <p>The scope of the project is evaluated and project parameters established using a formal evaluation/survey processes.</p> <p>Criteria from other related works impacting on the project are determined from specification of other work, site visits and/or discussion with appropriate person(s).</p> <p>Project budget is established by setting realistic expectations of deliverables and in consideration of tangible quality differences that result in the deliver the best value.</p>
<p><b>2 Develop design briefs.</b></p>	<p>2.1</p> <p>2.2</p> <p>2.3</p> <p>2.4</p> <p>2.5</p>	<p>Design brief is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.</p> <p>Design brief is developed in collaboration with all relevant design professionals and contractors involved in the project.</p> <p>Competent persons required for the project are identified and their roles specified in the design brief.</p> <p>Project design brief is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>Project design brief proposal is documented in accordance with organisation policies and procedures.</p>
<p><b>3 Obtain approval for design briefs.</b></p>	<p>3.1</p> <p>3.2</p>	<p>Project design brief is presented and discussed with person(s) of higher authority.</p> <p>Alterations to the project design brief resulting from the presentation/discussion, are negotiated with person(s) of higher authority within the constraints of organisation policy.</p>

- 3.3 Final project design brief is documented and approval obtained from appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing design briefs for electrotechnology projects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.5 Enterprise customer relations protocols
- 2.2.18 Critical path and project analysis
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing a project design brief incorporating any of the following electrotechnology disciplines:

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to

### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop design briefs for electrotechnology projects as described in 7) and including:
    - A Establishing the scope and parameters of the project.
    - B Determining the impact of other related works.
    - C Developing design brief incorporating scenarios and all requirements.
    - D Identifying competencies required for the project.
    - E Documenting project plan proposal.
    - F Negotiating alterations to the proposed design brief successfully.
    - G Obtaining approval of the final brief.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing design briefs for electrotechnology projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.6 to 3.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 1.6; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.7; 3.2

## UEENEEE016A Write specifications for electrotechnology projects

### Unit Descriptor

1)

This unit covers developing requirement to be incorporated into the writing of specifications for electrotechnology projects. It encompasses determining the safety requirements to be met, establishing client expectations, ensuring cost effective solutions are pursued and documenting design and technical requirements.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Electrotechnology

### ELEMENT

### PERFORMANCE CRITERIA

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>	
<p><b>1 Prepare specification requirements.</b></p>	<p>1.1</p>	<p>OHS processes and procedures for a given work area are identified, obtained and understood.</p>
	<p>1.2</p>	<p>Established techniques for specification writing are reviewed are adopted in accordance with organisation policies.</p>
	<p>1.3</p>	<p>The scope of the specification is established using a formal evaluation/survey processes.</p>
	<p>1.4</p>	<p>Criteria from other related works impacting on the specification are determined from other relevant documentation, site visits and/or discussion with appropriate person(s).</p>
<p><b>2 Write specification.</b></p>	<p>2.1</p>	<p>Specification is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.</p>
	<p>2.2</p>	<p>Specification is developed in collaboration with all relevant design professionals and contractors involved in the project.</p>
	<p>2.3</p>	<p>Competent persons required for the project are identified and their roles specified in the specification.</p>
	<p>2.4</p>	<p>Specification is reviewed against all inputs and adjusted to rectify any anomalies.</p>
	<p>2.5</p>	<p>Specification is developed in accordance with organisation policies and procedures.</p>
<p><b>3 Approval of specification is obtained.</b></p>	<p>3.1</p>	<p>Specification is presented and discussed with person(s) of higher authority.</p>
	<p>3.2</p>	<p>Alterations to the specification resulting from the discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.</p>
	<p>3.3</p>	<p>Specification is finalised and approval obtained from appropriate person(s).</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and writing specifications for electrotechnology projects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.6	Enterprise quality management systems, basics
2.2.7	Enterprise purchasing system
2.2.10	Job costing techniques
2.2.11.2	Specification development
2.2.15	Risk management, application and techniques
2.2.18	Critical path and project analysis
2.2.19	Customer/client relations
2.2.20	Computer use basics
2.2.25	Research concepts
2.18.8.2	Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing a project design brief incorporating any of the following electrotechnology disciplines:

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning

- Renewable/sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Write specifications for electrotechnology projects as described in 7) and including:
    - A Establishing the scope and parameters of the specification.
    - B Determining the impact of other related works.
    - C Developing the specification incorporating scenarios and all requirements.
    - D Identifying competencies required for the specifications.
    - E Writing specifications.
    - F Negotiating alterations to the proposed specification successfully.
    - G Obtaining approval of the final specification.

- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in writing specifications for electrotechnology projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.4; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: All	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2

## UEENEEE017A Implement and monitor OHS policies and procedures

### Unit Descriptor

1)

This unit covers the mandatory requirements of persons in a supervisory role to implement and monitor an organisation's Occupational Health and Safety policies, procedures and programs. It encompasses understanding an organisation's OHS obligations, providing safety information to staff, implementing and monitoring participative arrangements, safety procedures and training and maintaining safety records.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

Note:

1. Competency in this unit shall be assessed concurrently with other units in a qualification.
2. Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit addresses information, processes and techniques for the application of general Occupational Health and Safety requirements in workplaces and is essential for employees work supervisory responsibilities. The unit is based on Generic Competency A in the National Guidelines for Integrating OHS Competencies into National Industry Competency Standards [NOHSC: 7025 (1998) 2nd Edition].

Note:

All States/Territories and the Commonwealth have enacted legislation that establishes a general duty of care for workplace parties to ensure healthy and safe working conditions. In most workplaces, the final responsibility for providing a healthy and safe working environment, as far as practicable, rests with the employer. Employees also have a duty of care in relation to OHS that ensures their health and safety and that of others in the workplace. The relevant jurisdictional OHS legislation should always be consulted to ascertain the exact duties set down for employers and employees.

**Licence to practise 3.1)**

The competency described in this unit does not directly require a licence to practise but is subject to regulations for Occupational Health and Safety and contracts of training where they apply.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Provide OHS information to the work group.

1.1 Relevant provisions of Occupational Health and Safety legislation and codes of practice are accurately and clearly explained to the work group.

1.2 Information on the organisation’s Occupational Health and Safety policies, procedures and programs is provided in a readily accessible manner and is accurately and clearly explained to the work group.

1.3. Information about identified hazards and the outcomes of risk assessment and risk control procedures is regularly provided and is accurately and clearly explained to the work group.

2 Implement and monitor participative arrangements for the management of OHS.

2.1 Organisational procedures for consultation over Occupational Health and Safety issues are implemented and monitored to ensure that all members of the work group have the opportunity to contribute.

2.2 Issues raised through consultation are dealt with and resolved promptly or referred to the appropriate personnel for resolution in accordance with workplace procedures for issue resolution.

2.3 The outcomes of consultation over Occupational Health and Safety issues are made known to the work group promptly.

- |  |     |  |
|--|-----|--|
| 3. Implement and monitor the procedures for identifying hazards, assessing risk and controlling risks. | 3.1 | Existing and potential hazards in the work area are identified and reported so that risk assessment and risk control procedures can be applied.  |
|  | 3.2 | Work procedures to control risks are implemented and adherence to them by the work group is monitored in accordance with workplace procedures.   |
|  | 3.3 | Existing procedures to control risks are implemented and adherence to them by the work group is monitored in accordance with workplace procedures.   |
|  | 3.4 | Inadequacies in existing risk control measures are identified in accordance with the hierarchy of control and reported to designated personnel.  |
|  | 3.5 | Inadequacies in resource allocation for implementation of risk control measures identified and reported to designated personnel.   |
| 4. Implement the procedures for dealing with hazardous events.   | 4.1 | Workplace procedures for dealing with hazardous events are implemented whenever necessary to ensure that prompt control action is taken.   |
|  | 4.2 | Hazardous events are investigated to identify their cause in accordance with investigation procedures.   |
|  | 4.3 | Control measures to prevent recurrence and minimise risks of hazardous events are implemented based on the hierarchy of control if within scope of responsibilities and competencies or alternatively referred to designated personnel for implementation.               |
| 5. Implement and monitor the procedures for OHS training.  | 5.1 | Occupational health and safety training needs are identified accurately, specifying gaps between Occupational Health and Safety competencies required and those held by work group members.  |
|  | 5.2 | Arrangements are made for fulfilling identified Occupational Health and Safety training needs in both on and off-the-job training programs in consultation with relevant parties.  |
| 6. Implement and monitor the procedures for maintaining OHS records.                                   | 6.1 | Occupational health and safety records for work area are accurately and legibly completed in accordance with workplace requirements for Occupational Health and Safety records and legal requirements for the maintenance of records of occupational injury and disease. |

- 6.2 Aggregate information from the area’s Occupational Health and Safety records is used to identify hazards and monitor risk control procedures within work according to organisational procedures and within scope of responsibilities and competencies.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and implementing and monitoring OHS policies and procedures The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.8.1 Occupational Health and Safety, supervisory responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to hazards present in the industry and particular workplace
- Implementation of OHS and the specific safety procedures and work instructions for particular workplace

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling

employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Implement and monitor OHS policies and procedures as described in 7) and including:
    - A Providing OHS information to the work group.
    - B Implementing and monitoring participative arrangements for the management of OHS.
    - C Implementing and monitoring the procedures for identifying hazards, assessing risks and controlling risks.
    - D Implementing the procedures for dealing with hazardous events.
    - E Implementing and monitoring the procedures for OHS.
    - F Implementing and monitoring the procedures for maintaining OHS records.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in implementing and monitoring OHS policies and procedures.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3; 2.1	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	2

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  2.1	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.4 to 4.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  4.1 to 4.3

## UEENEEE018A Establish, maintain and evaluate OHS systems

### Unit Descriptor

1)

This unit covers the mandatory responsibility of an organisation's executive officers to establish, maintain and evaluate an OHS system. It encompasses understanding an organisation's OHS obligations, establishing and maintaining, participative arrangements, procedures for hazard identification, risk assessment and control measures, procedures for dealing with hazardous incidents, safety training, safety records, and evaluating the safety system.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

Note:

1. Competency in this unit shall be assessed concurrently with other units in a qualification.
2. Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit addresses information, processes and techniques for the application of general Occupational Health and Safety requirements in workplaces and is essential for employees without managerial responsibilities. The unit is based on Generic Competency A in the National Guidelines for Integrating OHS Competencies into National Industry Competency Standards [NOHSC: 7025 (1998) 2nd Edition].

Note:

All States/Territories and the Commonwealth have enacted legislation that establishes a general duty of care for workplace parties to ensure healthy and safe working conditions. In most workplaces, the final responsibility for providing a healthy and safe working environment, as far as practicable, rests with the employer. Employees also have a duty of care in relation to OHS that ensures their health and safety and that of others in the workplace. The relevant jurisdictional OHS legislation should always be consulted to ascertain the exact duties set down for employers and employees.

**Licence to practise 3.1)**

The competency described in this unit does not directly require a licence to practise but is subject to regulations for Occupational Health and Safety and contracts of training where they apply.

**Competency Field 4)**

Electrotechnology

**ELEMENT PERFORMANCE CRITERIA**

<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Establish and maintain the framework for the OHS system.</p>	<p>1.1 Occupational health and safety policies are developed which clearly express the organisation’s commitment with respect to Occupational Health and Safety within the area of managerial responsibility and how relevant Occupational Health and Safety legislation will be implemented, consistent with overall organisational policies.</p> <p>1.2 Occupational health and safety responsibilities and duties which will allow implementation and integration of the Occupational Health and Safety system are clearly defined, allocated and included in job descriptions and duty statements for all relevant positions.</p> <p>1.3. Financial and human resources for the operation of the Occupational Health and Safety system are identified, sought and/or provided in a timely and consistent manner.</p> <p>1.4 Information on the Occupational Health and Safety system and procedures for the area of managerial responsibility is provided and explained in a form which is readily accessible to employees.</p>
<p>2 Establish and maintain participative arrangements for management of OHS.</p>	<p>2.1 Appropriate consultative processes are established and maintained in consultation with employees and their representatives in accordance with relevant Occupational Health and Safety legislation and consistent with the organisation’s overall process for consultation.</p> <p>2.2 Issues raised through participation and consultation are dealt with and resolved promptly and effectively in accordance with procedures for issue resolution.</p>

- 2.3 Information about the outcomes of participation and consultation is provided in a manner accessible to employees.
- 3 Establish and maintain procedures for identifying hazards, assessing risk and controlling risk.
- 3.1 Existing and potential hazards within the area of managerial responsibility are correctly identified and identification confirmed in accordance with Occupational Health and Safety legislation, codes of practice and trends identified from the Occupational Health and Safety records system.
- 3.2 A procedure for ongoing identification of hazards is developed and integrated within systems of work and procedures.
- 3.3 Activities are appropriately monitored to ensure that this procedure is adopted effectively throughout the area of managerial responsibility.
- 3.4 Hazards identification is addressed at the planning, design and evaluation stages of any change in the workplace to ensure that new hazards are not created.
- 3.5 Risks presented by identified hazards are correctly assessed in accordance with Occupational Health and Safety legislation and coded of practice.
- 3.6 A procedure for ongoing assessment of risk is developed and integrated within systems of work and procedures.
- 3.7 Activities are monitored to ensure that this procedure is adopted effectively throughout the area of managerial responsibility.
- 3.8 Risk assessment is addressed at the planning, design and evaluation stages of any change within the area of managerial responsibility to ensure that the risk from hazards is not increased.
- 3.9 Measures to control assessed risks are developed and implemented in accordance with the hierarchy of control, relevant Occupational Health and Safety legislation, codes of practices and trends identified from the Occupational Health and Safety records system.
- 3.10 When measures which control a risk at its source are not immediately practicable, interim solutions are implemented until a control measure is developed.

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|---|--|--|---|
|   | 3.11   | A procedure for ongoing control of risks, based on the hierarchy of control, is developed and integrated with general systems of work and procedures.  |   |
|   | 3.12   | Activities are monitored to ensure that the risk control procedure is adopted effectively throughout the area of managerial responsibility.  |   |
|   | 3.13   | Risk control is addressed at the planning, design and evaluation stages of any change within the area of managerial responsibility to ensure that adequate risk control measures are included.                                   |   |
|   | 3.14   | Inadequacies in existing risk control measures are identified in accordance with the hierarchy of control, and resources enabling implementation of new measures are sought and/or provided according to appropriate procedures. |   |
| 4 | Establish and maintain procedures for dealing with hazardous events.   | 4.1  | Potential hazardous events are correctly identified.  |
|   |  | 4.2  | Procedures which would control the risks associated with hazardous events and meet any legislative requirements as a minimum are developed in consultation with appropriate emergency services.                         |
|   |  | 4.3  | Appropriate information and training is provided to all employees to enable implementation of the correct procedures in all relevant circumstances.   |
| 5 | Establish and maintain OHS training program.                           | 5.1  | An Occupational Health and Safety training program is developed and implemented to identify and fulfil employees' Occupational Health and Safety training needs as part of the organisation's general training program. |
| 6 | Establish and maintain a system for OHS records.                       | 6.1  | A system for keeping Occupational Health and Safety records is established and monitored to allow identification of patterns of occupational injury and disease within the area of managerial responsibility.           |
| 7 | Evaluate the OHS system and related policies, procedures and programs. | 7.1  | The effectiveness of the Occupational Health and Safety system and related policies, procedures and programs is assessed according to the organisation's aims with respect to occupational health and safety.           |
|   |  | 7.2  | Improvements to the Occupational Health and Safety system are developed and implemented to ensure more effective achievements of the organisation's aims with respect to occupational health and safety.                |

- 7.3 Compliance with Occupational Health and Safety legislation and codes of practice is assessed to ensure that legal Occupational Health and Safety standards are maintained as a minimum.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and establishing, maintaining and evaluating OHS systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to hazards present in the industry and particular workplace
- Establishing, maintaining and evaluating OHS system for the particular enterprise/organisation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in

a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Establish, maintain and evaluate OHS systems as described in 7) and including:
    - A Establishing and maintaining the framework for the OHS system.
    - B Establishing and maintaining participative arrangements for management of OHS.
    - C Establishing and maintaining procedures for identifying hazards, assessing risk and controlling risk.
    - D Establishing and maintaining procedures for dealing with hazardous events.
    - E Establishing and maintaining OHS training programs.
    - F Establish and maintain a system for OHS records.
    - G Evaluating the OHS system and related policies, procedures and programs.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Ability to implement these Occupational Health and Safety measures shall be demonstrated on all occasions safety issues arise.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in establishing, maintaining and

evaluating OHS systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3; 3.5; 4.1 to 4.3	2

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4; 3.3 to 3.4; 3.12	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.10; 3.12; 4.1	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.2; 3.1 to 3.14
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.14
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.4; 3.8; 3.13

## UEENEEE019A Solve problems in multiple path a.c. circuits

### Unit Descriptor

1)

This unit covers determining correct operation of single source a.c. parallel and series-parallel circuits and providing solutions as they apply to various electrotechnology work functions. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in multiple path circuits.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been acquired.

UEENEEE004A Solve problems in multiple path d.c. circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V a.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

## Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to work on multiple path a.c. electrical circuits.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 OHS risk control work preparation measures and procedures are followed.</p> <p>1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Solve multiple path a.c. circuit problems.	<p>2.1 OHS risk control work measures and procedures are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.4 Established methods are used to solve a.c. circuit problems from measure and calculated values as they apply to multiple path electrical circuit.</p> <p>2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.</p> <p>2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.</p>

- |   |  |     |   |
|---|--|-----|---|
| 3 | Complete work and document problem solving activities. | 3.1 | OHS work completion risk control measures and procedures are followed.                                      |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.                               |
|   |  | 3.3 | Justification for solutions used to solve circuit problems is documented.                                   |
|   |  | 3.4 | Work completion is documented and appropriate person(s) notified in accordance with established procedures. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in multiple path a.c. circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.8.2.2 | Alternating current principles-power      |
| 2.8.6   | Electromagnetic principles                |
| 2.11.1  | Hand tools                                |
| 2.18.1  | Occupational Health and Safety principles |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Single source parallel and series-parallel a.c. circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:
  - Computers
  - Data Communications
  - Electrical
  - Electronics
  - Fire protection
  - Instrumentation
  - Refrigeration and Air Conditioning
- In relation to at least two of the following types of circuit problems and on at least two occasions

- determining the operating parameters of an existing circuit
- alternating an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training

Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in multiple path a.c. circuits as described in 7) and including:
    - A Determining the operating parameters of an existing circuit.
    - B Alternating an existing circuit to comply with specified operating parameters.
    - C Developing circuits to comply with a specified function and operating parameters.
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice

**assessment** using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in multiple path a.c. circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4;	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## **UEENEEE020A Provide basic instruction in the use of electrotechnology apparatus**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers instructing customers/users in the use of electrotechnology apparatus. It encompasses appropriate customer relations, the use of apparatus manufacturer’s instruction material, basic instruction methods and evaluation and completing documentation.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite competencies for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Reading</td> <td style="width: 5%;">3</td> <td style="width: 25%;">Writing</td> <td style="width: 5%;">3</td> <td style="width: 25%;">Numeracy</td> <td style="width: 5%;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Electrotechnology</p>						

ELEMENT	PERFORMANCE CRITERIA
<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to instruct users.</p>	<p>1.1 OHS procedures for a given work area are obtained and understood through established routines and procedures.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Apparatus on which users are to be instructed is confirmed with work supervisor and/or other appropriate person(s).</p> <p>1.4 Safety features and safe use of the apparatus are reviewed by and understood.</p> <p>1.5 Familiarity with the apparatus is gained by reference to manufacturer’s user material and a preliminary run through to ensure the process is understood.</p> <p>1.6 Materials required to instruct are obtained in accordance with established routines and procedures.</p>
<p>2 Instruct users.</p>	<p>2.1 Users are informed of all the safety features and safe use of the apparatus in accordance with manufacturer’s instruction and regulatory requirements.</p> <p>2.2 Users are instructed in the set up and use of the apparatus in accordance with manufacturer’s instruction.</p> <p>2.3 Users are given the opportunity to show that they understand the safety aspects, set up features and operation of the apparatus.</p> <p>2.4 A copy of the apparatus manufacturer’s user instruction and other related documentation is given the appropriate person(s).</p> <p>2.5 Procedures for referring non-routine events to immediate supervisor for directions are followed.</p> <p>2.6 Instructions are given efficiently without damage to apparatus, the surrounding environment or services and using sustainable energy practices.</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing basic instruction in the use of electrotechnology apparatus

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.2.5 Enterprise customer relations protocols
- 2.2.13 User instruction techniques
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any single item of electrotechnology apparatus and its control.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide basic instruction in the use of electrotechnology apparatus as described in 7) and including:
    - A Following manufacturer’s user instructions.
    - B Giving clear instructions in the use of the apparatus.
    - C Giving users the opportunity to show that they understand the safe use of the apparatus.
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:  
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:  
Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing basic instruction in the use of electrotechnology apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:  
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters covering a unit or units that require formal documentation.

Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.2

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEE021A Plan an integrated cabling system

### Unit Descriptor

1)

This unit covers the planning of cable routes for power, lighting, communications, entertainment, distributed video and audio and energy management and control. This unit encompasses determining immediate and future cabling needs of an installation and their origins and termination points, planning cable routes, specifying cable types, sizes, fixing/support methods and cable identification systems and documenting cabling plans based on calculated and/or deemed-to-comply solutions as well as the planning of the wiring hub if required.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE008A Lay wiring and terminate accessories for extra-low voltage circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 3 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Determine immediate and future cabling needs.</p>	<p>1.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>1.2 Work supervisor or customers are consulted to determine immediate and future services required.</p> <p>1.3 Immediate and future location of service items and accessories is determined and written confirmation sought from appropriate persons.</p> <p>1.4 Safety and other regulatory requirements to which the installation shall comply are obtained and understood.</p>
<p>2 Plan an integrate cabling system for immediate and future services</p>	<p>2.1 Types and sizes of cables required for the various services are chosen to comply with technical standards, coded and regulations.</p> <p>2.2 Cables are arranged into circuits to ensure safe and functional operation of the services for which they are intended and to comply with technical standards, coded, regulations and budgetary restraints.</p> <p>2.3 Cabling for protective and functional earthing arrangements is determined to comply with technical standards, coded and regulations.</p> <p>2.4 Cabling routes are planned and cable support and methods for protection against damage specified to ensure compliance with technical standards, coded and regulations.</p> <p>2.5 Cable identification scheme is development to aid installation of services.</p> <p>2.6 Methods of terminating cables intended for future services are specified to ensure compliance with technical standards, coded and regulations.</p>
<p>3 Document the integrated cabling plan</p>	<p>3.1 Types and sizes of cables chosen, together with supporting justification, are documented in accordance with established procedures.</p>

- 3.2 Cable routes and cable support and methods for protection against damage are documented in accordance with established procedures.
- 3.3 Cable identification scheme and methods of terminating cables intended for future services are documented in accordance with established procedures.
- 3.4 Acceptance of the integrated cabling plan is sought from appropriate persons.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and planning integrated cabling installations.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.11 Integrated cabling arrangements
- 2.5.2.1 Technical standards, regulations and codes for general electrical installations
- 2.5.7 Technical standards, regulations and codes for telecommunications cabling.
- 2.5.9 Building codes, applicable to general electrotechnology installations
- 2.7.4.2 Electrical installations, circuit arrangements and cable selection
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to planning two integrated cabling installations for at least four of the following services.

- Electrical power and lighting
- Fixed home entertainment systems
- Integrated energy management system
- Security system

- Climate control system
- Renewable energy systems
- Water management system

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan integrated cabling installations as described in 7) and including:
    - A Determining immediate and future cabling needs accurately.
    - B Choosing appropriate type and size of cables for the immediate and future services.
    - C Planning cable routes and specifying effective support and protection method.
    - D Developing effective cable identification scheme.
    - E Specifying compliant termination methods for cables intended for future use.
    - F Documenting cabling plan including supporting justification.
    - G Dealing with unplanned events by drawing on

essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in planning integrated cabling installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED001A Use basic computer applications’

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.1 to 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2

Note:  
Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEE001A Use basic computer applications'

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2; 1.3, 2.2 to 2.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEE022A Carry out preparatory electrotechnology work activities

### Unit Descriptor

1)

This unit covers the carrying out of preparatory work related to any electrotechnology discipline. It encompasses working safely, following basic instructions under direct supervision. It will include electrotechnology support activities including the use of basic hand tools, the safe use of ladders and elevated work platforms and the fixing and securing of equipment under direction following routine work practices.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been acquired.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power

operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Plan to carry out basic electrotechnology support activities.

- 1.1 OHS procedures for a given work area are obtained and understood through established routines.
- 1.2 Established OHS risk control measures in preparation for the work are followed.
- 1.3 Safety hazards not previously identified are reported and advice on risk control measures is sought from the work supervisor.
- 1.4 Basic work instructions are obtained. The nature and location of the work is obtained from the supervisor or other appropriate person to establish the scope of work to be undertaken.
- 1.5 Basic work instructions are sought from the supervisor. Advice is sought from the supervisor or other appropriate person to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established routines.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Undertake electrotechnology support activities.

- 2.1 Established OHS risk control measures for carrying out the work are followed.
- 2.2 Plant and equipment is checked in strict accordance OHS requirements and procedures.
- 2.3 Mechanical equipment is installed straight and square in the required locations and within acceptable tolerances.

- |   |                            |   |   |
|---|----------------------------|---|---|
|   | 2.4                        | Use of basic hand and power tools in accordance with safe working practices and OHS requirements. |   |
|   | 2.5                        | Basic work instructions are carried out under supervision.  |   |
|   | 2.6                        | Procedures for referring non-routine events to immediate supervisor for directions are followed.  |   |
| 3 | Complete work and tidy up. | 3.1   | OHS work completion risk control measures and procedures are followed.                        |
|   |                            | 3.2   | Work site is cleaned and made safe in accordance with established procedures.                 |
|   |                            | 3.3   | Supervisor is notified of the completion of the work in accordance with established routines. |

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out preparatory electrotechnology work activities.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |   |
|--|----------|---|
|  | 2.1.1    | Cable protection and support              |
|  | 2.11.1   | Hand tools                                |
|  | 2.11.2.1 | Power tools                               |
|  | 2.11.3.1 | Fixing and support devices and techniques |
|  | 2.18.1   | Occupational Health and Safety principles |

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out preparatory electrotechnology work activities.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out preparatory electrotechnology work activities as described in 7) and including:
    - A Routing, placing and securing cables to comply with requirements.
    - B Placing and securing accessories accurately.
    - C Maintaining fire integrity.
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out preparatory electrotechnology work activities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- |             |  |
|-------------|--|
| UEENEEE002A | Dismantle, assemble and fabricate electrotechnology components |
| UEENEEE005A | Fix and secure equipment                                       |

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEE023A Solve basic problems electronic and digital equipment**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers determining correct operation of basic electronic and digital equipment and providing solutions as they apply to various electronic and computer work functions. It encompasses working safely, problem solving procedures, including the use of basic measuring devices, providing solutions derived from equipment behaviour and measurements to predictable problems.</p>						
<b>Prerequisite Unit(s)</b>	<b>2)</b>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite competencies to this unit</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Reading</td> <td style="width: 5%;">3</td> <td style="width: 25%;">Writing</td> <td style="width: 5%;">3</td> <td style="width: 25%;">Numeracy</td> <td style="width: 5%;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Electrotechnology</p>						

### **ELEMENT**

### **PERFORMANCE CRITERIA**

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to work electronic and digital equipment</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 OHS risk control work preparation measures and procedures are followed.</p> <p>1.3 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
<p>2 Solve electronic and digital equipment problems.</p>	<p>2.1 OHS risk control work measures and procedures are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.4 Established methods are used to solve electronic and digital equipment problems from observation or equipment behaviour and measured values.</p> <p>2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.</p> <p>2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.</p>

- |   |  |     |   |
|---|--|-----|---|
| 3 | Complete work and document problem solving activities. | 3.1 | OHS work completion risk control measures and procedures are followed.                                      |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.                               |
|   |  | 3.3 | Justification for solutions used to solve circuit problems is documented.                                   |
|   |  | 3.4 | Work completion is documented and appropriate person(s) notified in accordance with established procedures. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in electronic and digital equipment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.9.1.5 | Basic electronic principles               |
| 2.9.1.6 | Basic digital principles                  |
| 2.18.1  | Occupational Health and Safety principles |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- - Electronic and digital equipment problems as they apply to setting-up, fault finding, maintenance or development work functions in any of the following disciplines:
    - Computers
    - Data Communications
    - Electronics, and
  - In relation to the following types of electronic and digital equipment problems
    - Determining the operating parameters of existing operating equipment
    - Alternating existing equipment to comply with specified operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

---

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solving problems in electronic and digital equipment as described in 7) and including:
    - A Using methodical problem solving methods.
    - B Taking and recording measurements correctly and accurately using relevant measuring equipment.
    - C Deducing equipment behaviour correctly and accurately.
    - E Providing written justification for the solutions to problems.
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in multiple path d.c. circuits.

### **Method of assessment**

#### **8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

### **Concurrent assessment and relationship with other units**

#### **8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of Occupational Health and Safety covered in UEENEEE001A and other discipline specific Occupational Health and Safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEE024A **Compile and produce an electrotechnology report**

### Unit Descriptor

1)

This unit covers complying and producing an electrotechnology report. It encompasses determining the safety requirements are met and all regulatory responsibilities are adhered to. The person competent in this unit must demonstrate an ability to identify information sources and collect and analyse and format information applicable to the electrotechnology industry and produce a report as required.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after all core units have been achieved in the electrotechnology discipline in which competency in the unit is sought.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Electrotechnology

### ELEMENT

### PERFORMANCE CRITERIA

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to develop a report.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established techniques for report writing are reviewed are adopted in accordance with organisation policies.</p> <p>1.3 The scope of the report is evaluated and report parameters established using a formal evaluation/survey processes.</p> <p>1.4 Criteria from other related works impacting on the report are determined from other sources.</p> <p>1.5 Identify source and availability of information.</p>
<p>2 Develop report.</p>	<p>2.1 Report is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.</p> <p>2.2 Report is developed in collaboration with all relevant personnel.</p> <p>2.3 Competent persons are identified to assist in the compilation of the report.</p> <p>2.4 Report is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>2.5 Compile report in accordance with organisation policies and procedures.</p> <p>2.6 Compile and analyse research report information</p>
<p>3 Obtain approval for final report.</p>	<p>3.1 Report is presented and discussed with person(s) of higher authority.</p> <p>3.2 Alterations to the report resulting from the presentation/discussion, are negotiated with person(s) of higher authority within the constraints of organisation policy.</p> <p>3.3 Final report is presented and approval obtained from appropriate person(s).</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and compiling and producing an electrotechnology report.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.1	Enterprise communication methods
2.2.2	Enterprise work activities records
2.2.20	Computer use basics
2.2.21	Engineering analysis, decision making and reporting
2.2.25	Research concepts
2.2.33	Working in a team
2.2.35	Data collection techniques
2.2.36	Data analysis and presentation
2.18.8.2	Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit of competency describes work conducted by technical personnel who contribute to the conduct of report writing.

This unit of competency is typically performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter being reported upon. This unit of competency should be demonstrated in accordance with the organisations

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes

- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources
- Technical standards
- Regulatory requirements

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will

contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Compile and produce an electrotechnology report as described in 7) and including:
    - A Typical organisation policies and procedures.
    - B Access to a report brief to established report parameters.
    - C Access to appropriate person(s) to establish report requirements.
    - D Establishing the scope and parameters of the report.

- E Determining the impact of other related works.
- F Developing design brief incorporating scenarios and all requirements.
- G Appropriate computer application.
- H Identifying competencies required for the report.
- I Documenting report proposal.
- J Negotiating alterations to the proposed report successfully.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in compiling and producing an electrotechnology report.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.5; 2.3; 2.4; 3.1	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.2	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.4; 3.1

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.1 to 3.2

## UEENEEE025A **Solve problems in complex multiple path circuits**

### Unit Descriptor

1)

This unit covers determining correct operation of complex series-parallel circuits and providing solutions as they apply to various electrotechnology work functions. It encompasses working safely, problem solving procedures, including using electrical measuring devices, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE026A Provide computational solutions to basic engineering problems

AND

UEENEEH014A Solve problems in frequency dependent circuits

OR

UEENEEE050A Undertake computations in an electrotechnology environment

AND

UEENEEE029A Solve electrotechnical problems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs

under an approved contract of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to solve problems in complex multiple path circuits.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve problems in complex multiple path circuits.

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- |   |  |  |   |
|---|--|--|---|
|   | 2.3  | Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.                               |   |
|   | 2.4  | Established methods are used to solve circuit problems from measure and calculated values as they apply to complex multiple path circuit.  |   |
|   | 2.5  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |   |
|   | 2.6  | Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices. |   |
| 3 | Complete work and document problem solving activities. | 3.1  | OHS work completion risk control measures and procedures are followed.                                      |
|   |  | 3.2  | Work site is cleaned and made safe in accordance with established procedures.                               |
|   |  | 3.3  | Justification for solutions used to solve circuit problems is documented.                                   |
|   |  | 3.4  | Work completion is documented and appropriate person(s) notified in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in complex multiple path circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.9.1 Circuit analysis

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- 
- Complex series-parallel circuits as they apply to problems related to engineering diagnosis and development work functions in any of the following disciplines:
  - Computers

- Data Communications
- Electrical
- Electronics
- Instrumentation
- Refrigeration and Air Conditioning
- In relation to the following types of circuit problems and on at least two occasions:
  - Determining the operating parameters of an existing circuit
  - Alternating an existing circuit to comply with specified operating parameters
  - Developing circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be

‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in complex multiple path circuits as described in 7) and including:
    - A Determining the operating parameters of existing circuit.
    - B Using established problem solving methods.
    - C Taking relevant measurements accurately.

- D Interpreting measured values appropriately.
- E Providing effective solutions to circuit problems from measurements and calculations.
- F Giving written justification of solutions provided.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in complex multiple path circuits.

**Method of assessment****8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5
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## UEENEEE026A Provide computational solutions to basic engineering problems

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the application of computational processes to solve engineering problems. It encompasses working safely, applying problem solving techniques, using a range of mathematical processes, providing solutions to electrical/electronics engineering problems and justifying such solutions.</p> <p>Note. Typical engineering problems are those encountered in meeting requirements in a design brief, meeting performance requirements and compliance standards, revising systems operating parameters and dealing with system malfunctions</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite competencies for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Electrotechnology</p>						

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1	Provide computational solutions to engineering problems.	1.1	OHS procedures for a given work area are obtained and understood
		1.2	The nature of the problems are obtained from documentation or from work supervisor to establish the scope of work to be undertaken
		1.3	Problems are clearly stated in writing and/or diagrammatic form to ensure they are understood and appropriate methods used to resolve them.
		1.4	Known constants and variable related to the problem are obtained from measured values or problem documentation.
		1.5	Alternative methods for resolving the problem are considered and where necessary discussed with appropriate person(s).
		1.6	Problems are solved using appropriate mathematical processes and within the realistic accuracy.
2	Complete work and document problem solving activities	2.1	Justification for solutions used to solve engineering problems is documented for inclusion in work/project development records in accordance with professional standards.
		2.2	Work completion is documented and appropriate person(s) notified.

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing computational solutions to basic engineering problems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.8.10.1 Engineering Maths fundamentals
- 2.8.10.2 Engineering Maths
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to problems that apply to engineering diagnosis and development work functions in any of the following disciplines:

- Computers
- Data Communications
- Electrical
- Electronics
- Instrumentation
- Refrigeration and Air Conditioning

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical

equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide computational solutions to basic engineering problems as described in 7) and including:
    - A Clearly stating problems in written and diagrammatic form.
    - B Obtaining known constants and variable from an

appropriate source.

- C Solving problems using appropriate mathematical processes.
- D Documenting justification of solutions provided in accordance with professional standards.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing computational solutions to basic engineering problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.1; 2.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.2; 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEE027A Use advanced computational processes to provide solutions to engineering problems**

### **Unit Descriptor**

1)

This unit covers the application of advanced computational processes to solve engineering problems. It encompasses working safely, applying problem solving techniques, using a range of advanced mathematical processes, providing solutions to electrical/electronics engineering problems and justifying such solutions.

Note.

Typical engineering problems are those encountered in meeting requirements in a design brief, meeting performance requirements and compliance standards, revising systems operating parameters and dealing with system malfunctions.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE025A Solve problems in complex multiple path circuits

UEENEEE026A Provide computational solutions to basic engineering problems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 6.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable

contracts of training such as apprenticeships.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Provide computational solutions to engineering problems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 The nature of the problems are obtained from documentation or work supervisor to establish the scope of work to be undertaken.
- 1.3 Problems are clearly stated in writing and/or diagrammatic form to ensure they are understood and appropriate methods used to resolve them.
- 1.4 Known constants and variable related to the problem are obtained from measured values or problem documentation.
- 1.5 Alternative methods for resolving the problem are considered and where necessary discussed with appropriate person(s).
- 1.6 Problems are solved using advanced mathematical processes and within the realistic accuracy.

2 Complete work and document problem solving activities.

- 2.1 Justification for solutions used to solve engineering problems is documented for inclusion in work/project development records in accordance with professional standards.
- 2.2 Work completion is documented and appropriate person(s) notified.

**REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and using advanced computational processes to provide solutions to engineering problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.10.3 Advanced Engineering Maths

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to problems that apply to engineering diagnosis and development work functions in any of the following disciplines:

- Computers
- Data Communications
- Electrical
- Electronics
- Instrumentation
- Refrigeration and Air Conditioning

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries

risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Use advanced computational processes to provide solutions to engineering problems as described in 7) and including:
    - A Clearly stating problems in written and diagrammatic form.
    - B Obtaining known constants and variable from an appropriate source.

- C Solving problems using appropriate advanced mathematical processes.
- D Documenting justification of solutions provided in accordance with professional standards.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency in using advanced computational processes to provide solutions to engineering problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE025A Solve problems in complex multiple path circuits
- UEENEEE026A Provide computational solutions to basic engineering problems

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills

enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.1; 2.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.2; 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEE028A      **Develop engineering solutions to photonic problems**

### **Unit Descriptor**

1)

This unit covers developing engineering solutions to resolve problems with photonic systems. It encompasses working safely, apply extensive knowledge of photonic technologies and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE0025A      Solve problems in complex multiple path circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrotechnology

**ELEMENT****PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to develop engineering solution for photonic systems problems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 The extent of the photonic systems problem is determined from performance specifications and situation reports and in consultation with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Strategies are identified to ensure efficient development and implementation of solution(s).</p>
2 Develop engineering solutions for photonic system problems.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of photonic technology, operation, device characteristics and applications are applied to developing solutions to photonic system problems.</p> <p>2.3 Parameters, specifications and performance requirements in relation to each photonic system problem are obtained in accordance with established procedures.</p> <p>2.4 Approaches to resolving photonic system problems are analysed to provide most effective solutions.</p> <p>2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.</p> <p>2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.</p>

- |   |  |     |   |
|---|--|-----|---|
| 3 | Test, document and implement engineering solution for photonic problems. | 3.1 | Solutions to photonic problems are tested to determine their effectiveness and modified where necessary.  |
|   |  | 3.2 | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.  |
|   |  | 3.3 | Appropriately competent and qualified person(s) required to implement solutions to photonic system problems are coordinated in accordance with regulatory requirements and enterprise policy.<br><br>(See Note) |
|   |  | 3.4 | Justification for solutions used to solve photonic systems is documented for inclusion in work/project development records in accordance with professional standards.   |

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing engineering solutions to photonic problems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.87 Photonic principles and applications

2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four photonic system problems.

Note.

Typical photonic system problems are those encountered in meeting performance requirements and compliance standards, revising photonic operating parameters and dealing with photonic system malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Section 1, Clause 1.4.

### EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop engineering solutions to photonic problems as described in 7) and including:
    - A Understanding the extent of the photonic system problems.
    - B Forming effective strategies for solution development and implementation.
    - C Obtaining photonic system parameters, specifications and performance requirements appropriate to each problem.
    - D Testing and solutions to photonic system problems.
    - E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
    - F Documenting justification of solutions implemented in

accordance with professional standards.

- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing engineering solutions to photonic problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEE029A Solve electrotechnical problems

### Unit Descriptor

1)

This unit covers the application of calculations required to solve electrotechnical problems. It encompasses working safely, applying problem solving techniques, using a range of mathematical processes and techniques to providing solutions to electrotechnical problems, and justifying such solutions.

Note.

Typical electrotechnical problems are those encountered in meeting requirements in meeting performance requirements and compliance standards, revising systems operating parameters and dealing with system malfunctions

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Electrotechnology

## ELEMENT

## PERFORMANCE CRITERIA

<b>5) Elements describe the essential outcomes of a unit of competency</b>	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1 Provide calculated solutions to electrotechnical problems.	1.1	OHS procedures for a given work area are obtained and understood
	1.2	The nature of the problems are obtained from documentation or from work supervisor to establish the scope of work to be undertaken
	1.3	Problems are clearly stated in writing and/or diagrammatic form to ensure they are understood and appropriate methods used to resolve them.
	1.4	Known constants and variable related to the problem are obtained from measured values or problem documentation.
	1.5	Alternative methods for resolving the problem are considered and where necessary discussed with appropriate person(s).
	1.6	Problems are solved using appropriate mathematical processes and techniques and within the realistic accuracy.
2 Complete work and document calculated solutions to electrotechnical activities	2.1	Justification for solutions used to solve electrotechnical problems is documented for inclusion in work/project development records in accordance with professional standards.
	2.2	Work completion is documented and appropriate person(s) notified.

## REQUIRED SKILLS AND KNOWLEDGE

**6)** This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solve electrotechnical problems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.1.3 Electrotechnical principles

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solve electrotechnical problems that apply to electrotechnical diagnostic and systems processes in the development of work functions in any of the following disciplines:

- Computer systems
- Electrical/Electronics
- Refrigeration and Air Conditioning
- Renewable Energy

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be

‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Apply calculations required to solve electrotechnical problems as described in 7) and including:
    - A Clearly stating problems in written and diagrammatic form.
    - B Obtaining known constants and variable from an appropriate source.

- C Solving problems using appropriate calculations
- D Documenting justification of solutions provided in accordance with professional standards.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in applying calculations required to solve electrotechnical problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
1 Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.1; 2.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.2; 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEE030A Provide solutions to and report on routine electrotechnology problems

### Unit Descriptor

1)

This unit covers the application of fundamental numerical calculations required to solve routine electrotechnology problems and reporting the outcomes to requirements. It encompasses working safely, applying routine problem solving techniques, using a range of fundamental mathematical processes and techniques to identifying solutions to electrotechnology problems, and reporting the solutions.

Note.

Typical electrotechnology problems are those encountered in meeting routine performance requirements and compliance standards, interpreting the operating parameters of equipment and dealing with equipment malfunctions. Typical reports are those based on routine structures and formats, and require the application of routine communication fundamentals.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	2	Writing	2	Numeracy	2
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### Application of the Unit

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 2 or higher

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Perform fundamental numerical calculations to solve routine electrotechnology problems.	<p>1.1 OHS procedures for a given work area are obtained and understood</p> <p>1.2 The nature of the problems are obtained from documentation or from work supervisor to establish the scope of work to be undertaken</p> <p>1.3 Problems are clearly stated in writing and/or diagrammatic form to ensure they are understood and appropriate methods used to resolve them.</p> <p>1.4 Known constants and variable related to the problem are obtained from measured values or problem documentation.</p> <p>1.5 Methods for resolving non-routine problems are considered and discussed with appropriate person(s).</p> <p>1.6 Routine problems are solved using fundamental numerical calculations with resultant outcome aligned to realistic accuracy.</p> <p>1.7 Solutions to routine problems are documented in accordance with established procedures.</p>
2 Complete work and report on calculated solutions	<p>2.1 Solutions used to solve routine electrotechnology problems are recorded for inclusion in work/project records/technical reports in accordance with requirements.</p> <p>2.2 Known reporting requirements and structures are identified and used to prepare for the production of technical reports, which communicate the outcomes solved to appropriate person(s).</p> <p>2.3 Reports are produced to communicate the solved outcomes in accordance with requirements.</p> <p>2.4 Work completion is documented and appropriate person(s) notified.</p>

**REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices, providing solutions to and reporting on routine electrotechnology problems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.8.14.3 Electrotechnology Numeracy Diagnostic Assessment Methods
- 2.8.14.4 Electrotechnology Literacy Diagnostic Assessment Methods
- 2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solve routine electrotechnology problems using fundamental numerical calculations in equipment processes in the deployment of work functions and reporting their outcomes in accordance with requirements in any of the following disciplines:

- Computers
- Data Communications
- Electrical
- Electronics
- Instrumentation
- Refrigeration and Air Conditioning

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### Overview of Assessment

##### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile

- graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Apply fundamental calculations and standard reporting structures required to solve and report on routine electrotechnology problems as described in 7) and including:
      - A Identifying problems in written and diagrammatic form.
      - B Obtaining known constants and variables from an appropriate source to solve routine problems.
      - C Solving problems using appropriate fundamental calculations to achieve realistic and accurate outcomes.
      - D Using standard reporting structures and forms to prepare and produce routine documents/technical reports
      - E Interpreting and communicating solutions in routine documents/technical reports to appropriate person(s) in accordance with established procedures.
      - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in applying fundamental calculations required to solve routine electrotechnology problems with realistic

accuracy and formally reporting such outcomes to appropriate persons(s) and to requirements.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2; 2.3; 2.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; to 1.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	2

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  1.3 to 1.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3 to 2.4	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.6; 2.1; to 2.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.2; 1.3; 2.1; 2.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEE032A Document occupational hazards and risks in computer systems

### Unit Descriptor

1)

This unit covers i) occupational work hazard identification, ii) identifying health and safety risks to workers, iii) classification of risks, iv) documenting control measures intended to eliminate or reduce the risk that could potentially arise during the conduct of work activities and v) consultation processes with those involved with computer systems work. This unit primarily deals with the process involved in completing documentation and/or making appropriate modifications to pre-prepared documents.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after units in a qualification have been achieved for the electrotechnology discipline in which competency in this unit is sought.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
---------	---	---------	---	----------	---

### Application of the Unit

3)

This unit cannot be used in the workplace without the achievement of competence in other relevant technical units that are associated with other vocational disciplines at the same AQF level or in the same vocational discipline at another AQF level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

#### Notes:

1. In addition to OHS compliance there may be additional requirements to be licensed or obtain permits to work. Additionally, this may vary between jurisdictions but typically will relate to the operation of plant, machinery and equipment such as elevating work platforms, power

operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. They may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Competency in applying safety practices for working in close proximity to electrical power systems and equipment is covered by other specific safety-related units.

The skills and knowledge described in this unit should not be practised in the workplace until units relevant to a work function have been achieved.

**Competency Field 4)**

Electrotechnology

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Identify and document hazards and risks.

1.1 Hazards are identified using appropriate processes with involvement of others, where appropriate.

Note: Typically this will relate to such things as:

- The type of job
- Electrical conditions
- Energy levels
- Radiation levels
- Toxic substances
- Airborne particles
- Pressure discharge
- Explosive atmosphere
- Work-site location
- General work-site conditions
- Specific work location
- Moving parts
- Tools and equipment
- Workers competence and/or capacity and/or personal effects

1.2 Risks associated with identified hazards are determined in consultation with others, where appropriate, and documented in accordance with regulations and following established procedures.

- |   |   |  |
|---|---|--|
|   | 1.3   | Provision is made to accommodate changes to documentation should unforeseen hazards be identified.   |
| 2 | Determine risk class and document control measures. | 2.1 Risk class is determined for the risks involved in accordance with the regulations and following established procedures.   |
|   | 2.2   | Control measures are developed on the basis of the determined risk(s) and risk class to eliminate and/or mitigate the risk to health and safety in accordance with regulations and following established procedures. |
|   | 2.3   | Risk class and control measures are agreed to and documented in consultation with all involved, where appropriate, in accordance with regulations and established procedures.  |
| 3 | Monitor and review the control measures.            | 3.1 Documented control measures are made available for reference by all involved with the work.  |
|   | 3.2   | Control measures are modified where required in consultation with all involved with the work in accordance with established procedures.  |
|   | 3.3   | Documentation associated with the risk assessment process are filed in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and documenting occupational hazards and risks in computer systems.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.2.1   | Enterprise communication methods          |
| 2.2.2   | Enterprise work activities records        |
| 2.18.1  | Occupational Health and Safety principles |
| 2.18.16 | Documenting hazards and identifying risks |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to computer systems devices and hazards present in domestic, commercial and industrial buildings
- Accepted industry work procedures and the specific safety procedures and work instructions for a particular workplace.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Documenting occupational hazards and risks in computer systems as described in 7) and including:
    - A Identifying and noting hazards.
    - B Assessing the risks and developing and documenting control measures.
    - C Reviewing and documenting variations to prior arranged documents.
    - D Recording activities.
    - E Dealing with unplanned activities by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in documenting occupational hazards and risks in computer systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are also included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 2.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2, 1.2, 2.3, 3.1, 3.2, 3.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1, 1.2, 2.1, 2.2, 2.3, 3.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEE033A Document occupational hazards and risks in electrical work

### Unit Descriptor

1)

This unit covers i) occupational work hazard identification, ii) identifying health and safety risks to workers, iii) classification of risks, iv) documenting control measures intended to eliminate or reduce the risk that could potentially arise during the conduct of work activities and v) consultation processes with those involved with electrical work. This unit primarily deals with the process involved in completing documentation and/or making appropriate modifications to pre-prepared documents.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after units in a qualification have been achieved for the electrotechnology discipline in which competency in this unit is sought.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit cannot be used in the workplace without the achievement of competence in other relevant technical units that are associated with other vocational disciplines at the same AQF level or in the same vocational discipline at another AQF level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

#### Notes:

1. In addition to OHS compliance there may be additional requirements to be licensed or obtain permits to work. Additionally, this may vary between jurisdictions but typically will relate to the operation of plant, machinery and equipment such as elevating work platforms, power

operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. They may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Competency in applying safety practices for working in close proximity to electrical power systems and equipment is covered by other specific safety-related units.

The skills and knowledge described in this unit should not be practised in the workplace until units relevant to a work function have been achieved.

**Competency Field 4)**

Electrotechnology

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Identify and document hazards and risks.

1.1 Hazards are identified using appropriate processes with involvement of others, where appropriate.

Note: Typically this will relate to such things as

- The type of job
- Electrical conditions
- Energy levels
- Radiation levels
- Toxic substances
- Airborne particles
- Pressure discharge
- Explosive atmosphere
- Work-site location
- General work-site conditions
- Specific work location
- Moving parts
- Tools and equipment
- Workers competence and/or capacity and/or personal effects

1.2 Risks associated with identified hazards are determined in consultation with others, where appropriate, and documented in accordance with regulations and following established procedures.

- |   |   |  |
|---|---|--|
|   | 1.3   | Provision is made to accommodate changes to documentation should unforeseen hazards be identified.   |
| 2 | Determine risk class and document control measures. | <p>2.1 Risk class is determined for the risks involved in accordance with the regulations and following established procedures.</p> <p>2.2 Control measures are developed on the basis of the determined risk(s) and risk class to eliminate and/or mitigate the risk to health and safety in accordance with regulations and following established procedures.</p> <p>2.3 Risk class and control measures are agreed to and documented in consultation with all involved, where appropriate, in accordance with regulations and established procedures.</p> |
| 3 | Monitor and review the control measures.            | <p>3.1 Documented control measures are made available for reference by all involved with the work.</p> <p>3.2 Control measures are modified where required in consultation with all involved with the work in accordance with established procedures.</p> <p>3.3 Documentation associated with the risk assessment process are filed in accordance with established procedures</p>   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and documenting occupational hazards and risks in electrical.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.2.1   | Enterprise communication methods          |
| 2.2.2   | Enterprise work activities records        |
| 2.18.1  | Occupational Health and Safety principles |
| 2.18.16 | Documenting hazards and identifying risks |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to electrical devices and systems and hazards present in domestic, commercial and industrial buildings
- Accepted industry work procedures and the specific safety procedures and work instructions for a particular workplace.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be

‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Document occupational hazards and risks in electrical as described in 7) and including:
    - A Identifying and noting hazards.
    - B Assessing the risks and developing and documenting control measures.
    - C Reviewing and documenting variations to prior

arranged documents.

- D Recording activities.
- E Dealing with unplanned activities by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in documenting occupational hazards and risks in electrical.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are also included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2,

Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 2.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2, 2.3, 3.1, 3.2, 3.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>

1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1, 1.2, 2.1, 2.2, 2.3, 3.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEE034A Document occupational hazards and risks in electronics

### Unit Descriptor

1)

This unit deals primarily with the process involved in completing documentation and/or making appropriate modifications to pre-prepared documents. It covers:

- i) occupational work hazard identification
- ii) identifying health and safety risks to workers
- iii) classifying risks
- iv) documenting control measures intended to eliminate or reduce the risk that could potentially arise during the conduct of work activities, and
- v) consultation processes with those involved with computer systems work.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after units in a qualification have been achieved for the electrotechnology discipline in which competency in this unit is sought.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit cannot be used in the workplace without the achievement of competence in other relevant technical units that are associated with other vocational disciplines at the same AQF level or in the same vocational discipline at another AQF level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

Notes:

1. In addition to OHS compliance there may be additional requirements to be licensed or obtain permits to work. Additionally, this may vary between jurisdictions but typically will relate to the operation of plant, machinery and equipment such as elevating work platforms, power operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. They may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Competency in applying safety practices for working in close proximity to electrical power systems and equipment is covered by other specific safety-related units.

The skills and knowledge described in this unit should not be practised in the workplace until units relevant to a work function have been achieved.

**Competency Field 4)**

Electrotechnology

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
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5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Identify and document hazards and risks.

1.1 Hazards are identified using appropriate processes with involvement of others, where appropriate.

Note: Typically this will relate to such things as

- The type of job
- Electrical conditions
- Energy levels
- Radiation levels
- Toxic substances
- Airborne particles
- Pressure discharge
- Explosive atmosphere
- Work-site location
- General work-site conditions
- Specific work location
- Moving parts
- Tools and equipment
- Workers competence and/or capacity and/or personal effects

- |   |   |   |  |
|---|---|---|--|
|   | 1.2   | Risks associated with identified hazards are determined in consultation with others, where appropriate, and documented in accordance with regulations and following established procedures. |  |
|   | 1.3   | Provision is made to accommodate changes to documentation should unforeseen hazards be identified.  |  |
| 2 | Determine risk class and document control measures. | 2.1   | Risk class is determined for the risks involved in accordance with the regulations and following established procedures.   |
|   |   | 2.2   | Control measures are developed on the basis of the determined risk(s) and risk class to eliminate and/or mitigate the risk to health and safety in accordance with regulations and following established procedures. |
|   |   | 2.3   | Risk class and control measures are agreed to and documented in consultation with all involved, where appropriate, in accordance with regulations and established procedures.  |
| 3 | Monitor and review the control measures.            | 3.1   | Documented control measures are made available for reference by all involved with the work.  |
|   |   | 3.2   | Control measures are modified where required in consultation with all involved with the work in accordance with established procedures.  |
|   |   | 3.3   | Documentation associated with the risk assessment process are filed in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and documenting occupational hazards and risks in electrical.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.18.1 Occupational Health and Safety principles
- 2.18.16 Documenting hazards and identifying risks

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to electrical devices and systems and hazards present in domestic, commercial and industrial buildings
- Accepted industry work procedures and the specific safety procedures and work instructions for a particular workplace.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Document occupational hazards and risks in electrical as described in 7) and including:
    - A Identifying and noting hazards.
    - B Assessing the risks and developing and documenting control measures.
    - C Reviewing and documenting variations to prior arranged documents.

- D Recording activities.
- E Dealing with unplanned activities by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in documenting occupational hazards and risks in electrical.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are also included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2,

Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 2.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2, 2.3, 3.1, 3.2, 3.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>

1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1, 1.2, 2.1, 2.2, 2.3, 3.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEE035A Document occupational hazards and risks in instrumentation

### Unit Descriptor

1)

This unit primarily deals with the process involved in completing documentation and/or making appropriate modifications to pre-prepared documents. It covers

- i) occupational work hazard identification
- ii) identifying health and safety risks to workers
- iii) classification of risks
- iv) documenting control measures intended to eliminate or reduce the risk that could potentially arise during the conduct of work activities and
- v) consultation processes with those involved with computer systems work.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after units in a qualification have been achieved for the electrotechnology discipline in which competency in this unit is sought.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit cannot be used in the workplace without the achievement of competence in other relevant technical units that are associated with other vocational disciplines at the same AQF level or in the same vocational discipline at another AQF level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

Notes:

1. In addition to OHS compliance there may be additional requirements to be licensed or obtain permits to work. Additionally, this may vary between jurisdictions but typically will relate to the operation of plant, machinery and equipment such as elevating work platforms, power operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. They may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Competency in applying safety practices for working in close proximity to electrical power systems and equipment is covered by other specific safety-related units.

The skills and knowledge described in this unit should not be practised in the workplace until units relevant to a work function have been achieved.

**Competency Field 4)**

Electrotechnology

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
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5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Identify and document hazards and risks.

1.1 Hazards are identified using appropriate processes with involvement of others, where appropriate.

Note: Typically this will relate to such things as

- The type of job
- Electrical conditions
- Energy levels
- Radiation levels
- Toxic substances
- Airborne particles
- Pressure discharge
- Explosive atmosphere
- Work-site location
- General work-site conditions
- Specific work location
- Moving parts
- Tools and equipment
- Workers competence and/or capacity and/or personal effects

- |   |   |   |  |
|---|---|---|--|
|   | 1.2   | Risks associated with identified hazards are determined in consultation with others, where appropriate, and documented in accordance with regulations and following established procedures. |  |
|   | 1.3   | Provision is made to accommodate changes to documentation should unforeseen hazards be identified.  |  |
| 2 | Determine risk class and document control measures. | 2.1   | Risk class is determined for the risks involved in accordance with the regulations and following established procedures.   |
|   |   | 2.2   | Control measures are developed on the basis of the determined risk(s) and risk class to eliminate and/or mitigate the risk to health and safety in accordance with regulations and following established procedures. |
|   |   | 2.3   | Risk class and control measures are agreed to and documented in consultation with all involved, where appropriate, in accordance with regulations and established procedures.  |
| 3 | Monitor and review the control measures.            | 3.1   | Documented control measures are made available for reference by all involved with the work.  |
|   |   | 3.2   | Control measures are modified where required in consultation with all involved with the work in accordance with established procedures.  |
|   |   | 3.3   | Documentation associated with the risk assessment process are filed in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and documenting occupational hazards and risks in instrumentation.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.18.1 Occupational Health and Safety principles
- 2.18.16 Documenting hazards and identifying risks

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to electrical devices and systems and hazards present in domestic, commercial and industrial buildings
- Accepted industry work procedures and the specific safety procedures and work instructions for a particular workplace.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be

‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Document occupational hazards and risks in instrumentation as described in 7) and including:
    - A Identifying and noting hazards.
    - B Assessing the risks and developing and documenting control measures.
    - C Reviewing and documenting variations to prior

arranged documents.

- D Recording activities.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in documenting occupational hazards and risks in instrumentation.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are also included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed

in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 2.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2, 1.2, 2.3, 3.1, 3.2, 3.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>

1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1, 1.2, 2.1, 2.2, 2.3, 3.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEE036A Document occupational hazards and risks in refrigeration and air-conditioning**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit primarily deals with the process involved in completing documentation and/or making appropriate modifications to pre-prepared documents. It covers</p> <ul style="list-style-type: none"> <li>i) occupational work hazard identification</li> <li>ii) identifying health and safety risks to workers</li> <li>iii) classification of risks</li> <li>iv) documenting control measures intended to eliminate or reduce the risk that could potentially arise during the conduct of work activities and</li> <li>v) consultation processes with those involved with refrigeration and air-conditioning work.</li> </ul>						
<b>Prerequisite Unit(s)</b>	<b>2)</b>						
<b>Competencies</b>	<b>2.1)</b>						
	Competency in this unit shall be assessed only after units in a qualification have been achieved for the electrotechnology discipline in which competency in this unit is sought.						
<b>Literacy and numeracy skills</b>	<b>2.2)</b>						
	Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’						
	<table border="0"> <tr> <td>Reading</td> <td>3</td> <td>Writing</td> <td>3</td> <td>Numeracy</td> <td>3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<b>3)</b>						
	This unit cannot be used in the workplace without the achievement of competence in other relevant technical units that are associated with other vocational disciplines at the same AQF level or in the same vocational discipline at another AQF level.						
<b>Licence to practise</b>	<b>3.1)</b>						
	The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.						

Notes:

1. In addition to OHS compliance there may be additional requirements to be licensed or obtain permits to work. Additionally, this may vary between jurisdictions but typically will relate to the operation of plant, machinery and equipment such as elevating work platforms, power operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. They may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Competency in applying safety practices for working in close proximity to electrical power systems and equipment is covered by other specific safety-related units.

The skills and knowledge described in this unit should not be practised in the workplace until units relevant to a work function have been achieved.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Identify and document hazards and risks.

1.1 Hazards are identified using appropriate processes with involvement of others, where appropriate.

Note: Typically this will relate to such things as

- The type of job
- Electrical conditions
- Energy levels
- Radiation levels
- Toxic substances
- Airborne particles
- Pressure discharge
- Explosive atmosphere
- Work-site location
- General work-site conditions
- Specific work location
- Moving parts
- Tools and equipment
- Workers competence and/or capacity and/or personal effects

- |   |   |  |
|---|---|--|
|   | 1.2   | Risks associated with identified hazards are determined in consultation with others, where appropriate, and documented in accordance with regulations and following established procedures.  |
|   | 1.3   | Provision is made to accommodate changes to documentation should unforeseen hazards be identified.   |
| 2 | Determine risk class and document control measures. | <p>2.1 Risk class is determined for the risks involved in accordance with the regulations and following established procedures.</p> <p>2.2 Control measures are developed on the basis of the determined risk(s) and risk class to eliminate and/or mitigate the risk to health and safety in accordance with regulations and following established procedures.</p> <p>2.3 Risk class and control measures are agreed to and documented in consultation with all involved, where appropriate, in accordance with regulations and established procedures.</p> |
| 3 | Monitor and review the control measures.            | <p>3.1 Documented control measures are made available for reference by all involved with the work.</p> <p>3.2 Control measures are modified where required in consultation with all involved with the work in accordance with established procedures.</p> <p>3.3 Documentation associated with the risk assessment process are filed in accordance with established procedures</p>   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and documenting occupational hazards and risks in refrigeration and air-conditioning.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.18.1 Occupational Health and Safety principles
- 2.18.16 Documenting hazards and identifying risks

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to electrical devices and systems and hazards present in domestic, commercial and industrial buildings
- Accepted industry work procedures and the specific safety procedures and work instructions for a particular workplace.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Document occupational hazards and risks in refrigeration and air-conditioning as described in 7) and including:
    - A Identifying and noting hazards.
    - B Assessing the risks and developing and documenting control measures.
    - C Reviewing and documenting variations to prior arranged documents.

- D Recording activities.
- E Dealing with unplanned activities by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in documenting occupational hazards and risks in refrigeration and air-conditioning.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are also included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 2.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2, 1.2, 2.3, 3.1, 3.2, 3.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1, 1.2, 2.1, 2.2, 2.3, 3.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEE037A Document occupational hazards and risks in electrotechnology**

### **Unit Descriptor**

**1)**

This unit primarily deals with the process involved in completing documentation and/or making appropriate modifications to pre-prepared documents. It covers

- i) occupational work hazard identification
- ii) identifying health and safety risks to workers
- iii) classification of risks
- iv) documenting control measures intended to eliminate or reduce the risk that could potentially arise during the conduct of work activities and
- v) consultation processes with those involved with electrotechnology work.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit shall be assessed only after units in a qualification have been achieved for the electrotechnology discipline in which competency in this unit is sought.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit cannot be used in the workplace without the achievement of competence in other relevant technical units that are associated with other vocational disciplines at the same AQF level or in the same vocational discipline at another AQF level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

Notes:

1. In addition to OHS compliance there may be additional requirements to be licensed or obtain permits to work. Additionally, this may vary between jurisdictions but typically will relate to the operation of plant, machinery and equipment such as elevating work platforms, power operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. They may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Competency in applying safety practices for working in close proximity to electrical power systems and equipment is covered by other specific safety-related units.

The skills and knowledge described in this unit should not be practised in the workplace until units relevant to a work function have been achieved.

**Competency Field 4)**

Electrotechnology

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Identify and document hazards and risks.

1.1 Hazards are identified using appropriate processes with involvement of others, where appropriate.

Note: Typically this will relate to such things as

- The type of job
- Electrical conditions
- Energy levels
- Radiation levels
- Toxic substances
- Airborne particles
- Pressure discharge
- Explosive atmosphere
- Work-site location
- General work-site conditions
- Specific work location
- Moving parts
- Tools and equipment
- Workers competence and/or capacity and/or personal effects

- |   |   |   |  |
|---|---|---|--|
|   | 1.2   | Risks associated with identified hazards are determined in consultation with others, where appropriate, and documented in accordance with regulations and following established procedures. |  |
|   | 1.3   | Provision is made to accommodate changes to documentation should unforeseen hazards be identified.  |  |
| 2 | Determine risk class and document control measures. | 2.1   | Risk class is determined for the risks involved in accordance with the regulations and following established procedures.   |
|   |   | 2.2   | Control measures are developed on the basis of the determined risk(s) and risk class to eliminate and/or mitigate the risk to health and safety in accordance with regulations and following established procedures. |
|   |   | 2.3   | Risk class and control measures are agreed to and documented in consultation with all involved, where appropriate, in accordance with regulations and established procedures.  |
| 3 | Monitor and review the control measures.            | 3.1   | Documented control measures are made available for reference by all involved with the work.  |
|   |   | 3.2   | Control measures are modified where required in consultation with all involved with the work in accordance with established procedures.  |
|   |   | 3.3   | Documentation associated with the risk assessment process are filed in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and documenting occupational hazards and risks in electrotechnology.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.18.1 Occupational Health and Safety principles
- 2.18.16 Documenting hazards and identifying risks

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to electrical devices and systems and hazards present in domestic, commercial and industrial buildings
- Accepted industry work procedures and the specific safety procedures and work instructions for a particular workplace.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Document occupational hazards and risks in electrotechnology as described in 7) and including:
    - A Identifying and noting hazards.
    - B Assessing the risks and developing and documenting control measures.
    - C Reviewing and documenting variations to prior arranged documents.

- D Recording activities.
- E Dealing with unplanned activities by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in documenting occupational hazards and risks in electrotechnology.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are also included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2,

Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 2.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2, 1.2, 2.3, 3.1, 3.2, 3.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.3	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>

1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1, 1.2, 2.1, 2.2, 2.3, 3.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEE038A Participate in development and follow a personal competency development plan**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the application of skills and knowledge in taking responsibility for ones own competency development. It encompasses understanding the structure of a competency development plan, participating the development of a personal competency development plan, understanding responsibilities and obligation under competency development plan, following activities for developing competency, self-monitoring competency development and meeting trainee obligations for periodic reporting of competency development activities.</p>						
<b>Prerequisite Unit(s)</b>	<b>2)</b>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite competencies for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended to support competency development entry-level employment based programs incorporated in approved contracts of training.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Electrotechnology</p>						

### **ELEMENT**

### **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Participate in the development of a personal competency development plan.	<p>1.1 The nature of competency-based training is sought from discussions with appropriate persons and understood.</p> <p>1.2 The responsibilities/obligations of trainees/learners, their employers, trainers and assessors in a competency-based development program are sought from discussions with appropriate persons and understood.</p> <p>1.3 Competencies to be achieved in a personal competency development plan are established in discussions with appropriate persons.</p> <p>1.4 Details on how to achieve the individual competencies in the plan are sought from discussions with appropriate persons and understood.</p>
2 Follow a personal competency development plan.	<p>2.1 All aspects of the competency development plan are put into practice and followed diligently.</p> <p>2.2 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued</p> <p>2.3 Assistance is sought from appropriate persons to overcome difficulties in develop skills and apply knowledge relevant to a particular competency.</p> <p>2.4 Progress in competency development is self monitored against the competency development plan.</p> <p>2.5 Modifications to the personal competency development plan are made in consultation with appropriate persons.</p> <p>2.6 Trainee/learners responsibility for periodic and timely reporting of competency development activities is followed.</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.45	Responsibilities under a competency development plan
2.2.46	Methods of monitoring and reporting competency development activities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to an individual's competency development in an electrotechnology discipline and qualification. It includes a competency development plan and instructions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Participate in development and follow a personal competency development plan as described in 7) and including:
  - A Seeking and understanding the responsibilities under a competency development plan.
  - B Seeking and understanding how to achieve the individual competencies in the plan.
  - C Following all aspects of the plan diligently.
  - D Pursuing opportunities to develop competency.
  - E Seeking assistance to overcome difficulties in developing competency.
  - F Self-monitoring competency development.
  - G Periodically reporting competency development activities.
  - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in participating in development and following a personal competency development plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which

is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence development in this unit may be assessed concurrently with other units in a qualification.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 2.2	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEE040A Identify and select components/accessories/materials for electrotechnology work activities**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers undertaking a schedule of work for selecting appropriately identified components, accessories or materials in an agreed time, to a quality standard and with a minimum of waste, using appropriate technology mediums where required.</p>						
<b>Prerequisite Unit(s)</b>	<b>2)</b>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p> <p>Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures</li> </ol>						

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to identify components, accessories and materials.

- 1.1 Instructions for preparing components, accessories or materials identification is communicated and confirmed to ensure clear understanding.
- 1.2 OHS policies and procedures are communicated and confirmed to ensure they are understood as they apply in the carrying out of the work.
- 1.3 Necessary tools, equipment and personnel protective equipment are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with established procedures.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved.
- 1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with established procedures.
- 1.6 Schedule(s) for identifying components, accessories or materials including practices for working safely are confirmed in accordance with instructions and requirements.

2 Select components, accessories and materials.

- 2.1 OHS policies and procedures and safe work practices are followed.
- 2.2 Schedule for selecting components, accessories or materials is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste, using appropriate technology.
- 2.3 Further instructions are sought from appropriate personnel in the event of unplanned happenings or conditions.
- 2.4 Ongoing checks of work quality are undertaken in accordance with instructions and requirements.

- |   |   |     |  |
|---|---|-----|--|
| 3 | Confirm selection of components, accessories and materials. | 3.1 | Final checks are made to ensure selection of components, accessories or materials conforms with instructions.  |
|   |   | 3.2 | Appropriate personnel are notified of completion of the selection process.   |
|   |   | 3.3 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
|   |   | 3.4 | Work area is cleaned up and made safe and sustainable energy practices are followed.   |
|   |   | 3.5 | Appropriate records are updated in accordance with instructions and established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and identifying and selecting components/accessories/materials for electrotechnology work activities.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |  |
|---------|--|
| 2.2.40  | Electrotechnology Industry organisations and practises |
| 2.8.1.2 | Fundamental electrical principles                      |
| 2.8.2.1 | Direct current circuit principles                      |
| 2.8.13  | Parts and components selection                         |
| 2.18.1  | Occupational Health and Safety principles              |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to identifying and selecting components/accessories/materials for electrotechnology work activities in any of the following disciplines:

- Appliances
- Business equipment
- Computers

- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.2

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on

the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Identify and select components/accessories/materials for electrotechnology work activities as described in 7) and including:
    - A Understanding work instruction.
    - B Obtaining and checking tools and equipment.
    - C Following work schedules.
    - D Returning tools and surplus resources as required.

- E Updating work records.
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in identifying and selecting components/accessories/materials for Electrotechnology work activities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6; 2.1 to 2.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.6; 2.3; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
1 Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## **UEENEEE041A Use routine equipment/plant/technologies in an electrotechnology environment**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers routine tools, equipment and personnel protective equipment required to do work in the Electrotechnology environment, is used in accordance with the schedule of work to ensure work is completed in an agreed time, to a quality standard and with a minimum waste.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p> <p>Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.</li> </ol>						
<b>Competency Field</b>	<p><b>4)</b></p>						

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to use routine equipment, plant and technologies	<p>1.1 Instructions in the use of routine equipment, plant or technologies are communicated and confirmed to ensure clear understanding.</p> <p>1.2 OHS policies and procedures are communicated and confirmed to ensure they are understood as they apply in the carrying out of the work.</p> <p>1.3 Tools, equipment and personnel protective equipment necessary for the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with established procedures.</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved.</p> <p>1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with established procedures.</p> <p>1.6 Schedule of work including practices for working safely are confirmed in accordance with instructions and requirements.</p>
2 Use routine equipment, plant and technologies	<p>2.1 OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents.</p> <p>2.2 Routine equipment, plant or technologies are used in accordance with schedule of work to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste.</p> <p>2.3 Further instructions are sought from appropriate personnel in the event of unplanned happenings or conditions.</p> <p>2.4 Ongoing checks of work quality are undertaken in accordance with instructions and requirements.</p>
3 Complete use of routine equipment, plant and technologies	<p>3.1 Final checks are made to ensure the use of routine equipment, plant or technologies conforms with instructions and to requirements.</p>

- 3.2 Appropriate personnel are notified of completion of the work using routine equipment, plant or technologies.
- 3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.4 Work area is cleaned up and made safe and sustainable energy practices are followed.
- 3.5 Appropriate records are updated in accordance with instructions and established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and using routine equipment/plant/technologies in an electrotechnology environment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.40 Electrotechnology Industry organisations and practises
- 2.8.1.2 Fundamental electrical principles
- 2.8.13 Parts and components selection
- 2.18.1 Occupational health and safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the use of routine equipment/plant/technologies in an electrotechnology environment in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection

- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training

Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Use of routine equipment/plant/technologies in an electrotechnology environment as described in 7) and including:
    - A Understanding work instruction.
    - B Obtaining and checking tools and equipment.
    - C Following work schedules.
    - D Using routine equipment/plant/technologies in accordance with work schedules.
    - E Returning tools and surplus resources as required.
    - F Updating work records.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in using routine equipment/plant/technologies in an Electrotechnology environment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## UEENEEE042A Produce routine products for carrying out electrotechnology work activities

### Unit Descriptor

1)

This unit covers routine products required to do work in the Electrotechnology environment are produced in accordance with the schedule of work ensuring work is completed in an agreed time, to a quality standard and with a minimum waste.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite units for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

### Competency Field

4)

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to produce routine products.</p>	<p>1.1 Instructions for preparing the work activity are communicated and confirmed to ensure clear understanding routine products.</p> <p>1.2 OHS policies and procedures are communicated and confirmed to ensure they are understood as they apply to the carrying out of the work.</p> <p>1.3 Necessary tools, equipment and personnel protective equipment are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with established procedures.</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved.</p> <p>1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with established procedures.</p> <p>1.6 Schedule of work including practices for working safely are confirmed in accordance with instructions and requirements.</p>
<p>2 Produce routine products.</p>	<p>2.1 OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents products.</p> <p>2.2 Schedule of work is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste.</p> <p>2.3 Further instructions are sought from appropriate personnel in the event of unplanned happenings or conditions.</p> <p>2.4 Ongoing checks of work quality are undertaken in accordance with instructions and requirements.</p>
<p>3 Check results of products produced.</p>	<p>3.1 Final checks are made to ensure the completed work conforms with instructions and to requirements products produced.</p> <p>3.2 Appropriate personnel are notified of completion of the work.</p>

- 3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.4 Work area is cleaned up and made safe and sustainable energy practices are followed.
- 3.5 Appropriate records are updated in accordance with instructions and established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and producing routine products for carrying out electrotechnology work activities.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.40 Electrotechnology Industry organisations and practises
- 2.5.1.1 Drawing interpretation and sketching
- 2.8.1.2 Fundamental electrical principles
- 2.8.2.1 Direct current circuits principles
- 2.8.13 Parts and components selection
- 2.11.1 Hand tools
- 2.11.2.1 Power tools
- 2.11.4 Dismantling and assembly techniques
- 2.11.13.2 Introduction to welding
- 2.11.19 Electrotechnology engineering practices
- 2.18.1 Occupational health and safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to producing routine products for carrying out electrotechnology work activities in any of the following disciplines:

- Appliances
- Business equipment

- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Produce routine products for carrying out electrotechnology work activities as described in 7) and including:
    - A Understanding work instructions.
    - B Obtaining and checking tools and equipment.
    - C Following work schedules.
    - D Producing products in accordance with work schedule.

- E Returning tools and surplus resources as required.
- F Updating work records.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in producing routine products for carrying out Electrotechnology work activities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2,

Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## **UEENEEE043A Produce routine tools/devices for carrying out electrotechnology work activities**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers routine tools/devices required to do work in the Electrotechnology environment are produced in accordance with the schedule of work ensuring work is completed in an agreed time, to a quality standard and with a minimum waste.</p>						
<b>Prerequisite Unit(s)</b>	<b>2)</b>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p> <p>Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.</li> </ol>						
<b>Competency Field</b>	<b>4)</b>						

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to produce routine products.	<p>1.1 Instructions for preparing the work activity are communicated and confirmed to ensure clear understanding routine products.</p> <p>1.2 OHS policies and procedures are communicated and confirmed to ensure they are understood as they apply to the carrying out of the work.</p> <p>1.3 Tools, equipment and personnel protective equipment necessary for the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with established procedures.</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved.</p> <p>1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with established procedures</p> <p>1.6 Schedule of work including practices for working safely are confirmed in accordance with instructions and requirements</p>
2 Produce routine products.	<p>2.1 OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents products.</p> <p>2.2 Schedule of work is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste.</p> <p>2.3 Further instructions are sought from appropriate personnel in the event of unplanned happenings or conditions.</p> <p>2.4 Ongoing checks of work quality are undertaken in accordance with instructions and requirements</p>
3 Check results routine tools and devices produced.	3.1 Final checks are made to ensure the completed work conforms with instructions and to requirements routine tools and devises produced.

- 3.2 Appropriate personnel are notified of completion of the work.
- 3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.4 Work area is cleaned up and made safe and sustainable energy practices are followed.
- 3.5 Appropriate records are updated in accordance with instructions and established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and producing routine tools/devices for carrying out electrotechnology work activities. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.40 Electrotechnology Industry organisations and practises
- 2.5.1.1 Drawing interpretation and sketching
- 2.8.1.2 Fundamental electrical principles
- 2.8.2.1 Direct current circuits principles
- 2.8.13 Parts and components selection
- 2.11.1 Hand tools
- 2.11.2.1 Power tools
- 2.11.4 Dismantling and assembly techniques
- 2.11.13.2 Introduction to welding
- 2.11.19 Electrotechnology engineering practices
- 2.18.1 Occupational health and safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to producing routine tools/devices for carrying out electrotechnology work activities in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Produce routine tools/devices for carrying out electrotechnology work activities as described in 7) and including:
    - A Understanding work instructions.
    - B Obtaining and checking tools and equipment.
    - C Following work schedules.
    - D Producing products in accordance with work schedule.
    - E Returning tools and surplus resources as required.
    - F Updating work records.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in producing routine tools/devices for carrying out electrotechnology work activities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential

knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**  
Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:	

	N/A	
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## UEENEEE044A Apply technologies and concepts to electrotechnology work activities

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers undertake Electrotechnology work activities using a range of technologies such as computers, and apply analytical concepts to achieve the desired outcome ensuring work is completed in an agreed time, to a quality standard and with a minimum of waste.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="padding-right: 20px;">Reading</td> <td style="padding-right: 20px;">3</td> <td style="padding-right: 20px;">Writing</td> <td style="padding-right: 20px;">3</td> <td>Numeracy</td> <td>3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p> <p>Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.</li> </ol>						
<b>Competency Field</b>	<p><b>4)</b></p>						

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to apply technologies and concepts.	<p>1.1 Instructions for the preparation to apply technologies and concepts are communicated and confirmed to ensure clear understanding.</p> <p>1.2 OHS policies and procedures are communicated and confirmed to ensure they are understood as they apply to the carrying out of the work.</p> <p>1.3 Tools, equipment and personnel protective equipment necessary for the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with established procedures.</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved.</p> <p>1.5 Resources and materials needed to apply technologies and concepts are confirmed, scheduled and obtained in accordance with established procedures.</p> <p>1.6 Schedule to apply technologies and concepts, including practices for working safely, are confirmed in accordance with instructions and requirements.</p>
2 Use technologies and apply concepts to the carrying out of work.	<p>2.1 OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents.</p> <p>2.2 Schedule of using technologies and applying concepts to the achieving the desired outcome is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste.</p> <p>2.3 Further instructions are sought from appropriate personnel in the event of unplanned happenings or conditions.</p> <p>2.4 Ongoing checks of work quality are undertaken in accordance with instructions and requirements.</p>

- |   |  |     |  |
|---|--|-----|--|
| 3 | Check results in the use of technologies and applications of concepts. | 3.1 | Final checks are made to ensure the use of technologies and applications of concepts conforms with instructions and to requirements.                                 |
|   |  | 3.2 | Appropriate personnel are notified of completion in the use of technologies and applications of concepts.  |
|   |  | 3.3 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
|   |  | 3.4 | Work area is cleaned up and made safe and sustainable energy practices are followed.   |
|   |  | 3.5 | Appropriate records are updated in accordance with instructions and established procedures   |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying technologies and concepts to electrotechnology work activities.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.2.20   | Computer use basics                                    |
| 2.2.40   | Electrotechnology Industry organisations and practises |
| 2.4.11   | Personal computers hardware structure                  |
| 2.5.1.1  | Drawing Interpretation and Sketching                   |
| 2.8.1.2  | Fundamental electrical principles                      |
| 2.8.2.1  | Direct current circuit principles                      |
| 2.8.13   | Parts and components selection                         |
| 2.11.1   | Hand tools   |
| 2.11.2.1 | Power tools  |
| 2.11.4   | Dismantling and assembly techniques                    |
| 2.18.1   | Occupational Health and Safety principles              |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to producing routine products for carrying out electrotechnology work activities in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Apply technologies and concepts to electrotechnology work activities as described in 7) and including:
  - A Understanding work instruction.
  - B Obtaining and checking tools and equipment.
  - C Following work schedules.
  - D Using technologies and applying concepts appropriately.
  - E Returning tools and surplus resources as required.
  - F Updating work records.
  - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in applying technologies and concepts to Electrotechnology work activities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEE045A      Apply computation when using equipment/materials/concepts in an electrotechnology environment**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers undertaking computations to produce appropriate results using a range of equipment, materials and concepts in carrying out Electrotechnology work activities, whilst ensuring work is completed in an agreed time, to a quality standard and with a minimum of waste.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p> <p style="margin-left: 20px;">Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.</li> </ol>						
<b>Competency Field</b>	<p><b>4)</b></p>						

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to apply computations when using equipment, materials and concepts.	<p>1.1 Instructions for the preparation to apply computations when using equipment, materials or concepts are communicated and confirmed to ensure clear understanding.</p> <p>1.2 OHS policies and procedures are communicated and confirmed to ensure they are understood as they apply to the carrying out of the work.</p> <p>1.3 Tools, equipment and personnel protective equipment necessary for the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with established procedures.</p> <p>1.4 Appropriate personnel are consulted to ensure computations when using equipment, materials or concepts is coordinated effectively with others involved.</p> <p>1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with established procedures.</p> <p>1.6 Schedule of computations to be applied when using equipment, materials or concepts, including practices for working safely, are confirmed in accordance with instructions and requirements.</p>
2 Carry out computations when using equipment, materials and concepts.	<p>2.1 OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents.</p> <p>2.2 Schedule of computations is followed to ensure the use equipment, materials or concepts is completed in an agreed time, to a quality standard and with a minimum of waste.</p> <p>2.3 Further instructions are sought from appropriate personnel in the event of unplanned happenings or conditions.</p> <p>2.4 Ongoing checks of quality of the computations are undertaken in accordance with instructions and requirements.</p>

3	Confirm results of computations when using equipment, materials and concepts.	3.1	Confirm results of computations when using equipment, materials and concepts.
		3.2	Appropriate personnel are notified of completion of the computations.
		3.3	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
		3.4	Work area is cleaned up and made safe and sustainable energy practices are followed.
		3.5	Appropriate records are updated in accordance with instructions and established procedures.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying computation when using equipment/materials/concepts in an electrotechnology environment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.40 Electrotechnology Industry organisations and practises
- 2.8.1.2 Fundamental electrical principles
- 2.8.2.1 Direct current circuit principles
- 2.8.13 Parts and components selection
- 2.8.15.1 Applied mathematic concepts
- 2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to producing routine products for carrying out electrotechnology work activities in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications

- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will

contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Apply computation when using equipment/materials/concepts in an electrotechnology environment as described in 7) and including:
    - A Understanding work instruction.
    - B Obtaining and checking tools and equipment.
    - C Following work schedules.
    - D Applying computations accurately.
    - E Returning tools and surplus resources as required.

- F Updating work records.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency in applying computation when using equipment/materials/concepts in an Electrotechnology environment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.3; 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.3; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## **UEENEEE046A Identify effects of energy on machinery and materials in an electrotechnology environment**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers effects of energy on machinery and/or materials used in an Electrotechnology environment are identified and completed in an agreed time, to a quality standard and using appropriate technology mediums, where required. It encompasses working safely, applying knowledge of identifying the effects of energy on machinery and materials in an electrotechnology environment..</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p> <p>Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.</li> </ol>						

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to identify effects of energy on machinery and materials.

- 1.1 Instructions for identifying effects of energy on machinery or materials are communicated and confirmed to ensure clear understanding.
- 1.2 OHS policies and procedures are communicated and confirmed to ensure they are understood as they apply to the carrying out of the work.
- 1.3 Tools, equipment and personnel protective equipment necessary for the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with established procedures.
- 1.4 Appropriate personnel are consulted to ensure effects of energy on machinery or materials are identified and coordinated effectively with others involved.
- 1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with established procedures.
- 1.6 Schedule for identifying effects of energy on machinery or materials including practices for working safely are confirmed in accordance with instructions and requirements.

2 Identify effects of energy on machinery and materials.

- 2.1 OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents.
- 2.2 Schedule for identifying effects of energy on machinery or materials work is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste.
- 2.3 Further instructions are sought from appropriate personnel in the event of unplanned happenings or conditions.
- 2.4 Ongoing checks of work quality are undertaken in accordance with instructions and requirements.

- |   |  |     |  |
|---|--|-----|--|
| 3 | Check results of the effects of energy on machinery and materials. | 3.1 | Final checks are made to ensure the effects of energy on machinery or materials as identified conforms with instructions and to requirements.                        |
|   |  | 3.2 | Appropriate personnel are notified of completion of the computations.  |
|   |  | 3.3 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
|   |  | 3.4 | Work area is cleaned up and made safe and sustainable energy practices are followed.   |
|   |  | 3.5 | Appropriate records are updated in accordance with instructions and established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and identifying effects of energy on machinery and materials in an electrotechnology environment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.15.2 Applied physics concepts

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to identifying effects of energy on machinery and materials in electrotechnology environments in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation

- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Identify effects of energy on machinery and materials in an electrotechnology environment as described in 7) and including:
    - A Understanding work instruction.
    - B Obtaining and checking tools and equipment.
    - C Following work schedules.
    - D Identifying the effects of energy appropriately.
    - E Returning tools and surplus resources as required.
    - F Updating work records.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:  
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:  
Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in identifying effects of energy on machinery and materials in an electrotechnology environment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:  
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	1.1; 1.2; 2.3; 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 2.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4, 3.1	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  3.3	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:

		All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.1

## UEENEEE047A Identify building techniques, methods and materials used in electrotechnology work activities

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers identifying a range of techniques, methods and materials used in Electrotechnology work activities including types of fixing devices, segregation requirements, fixing structures, walls and floor structures, lifting techniques and other related building materials.</p> <p>It encompasses working safely, applying knowledge of identifying building techniques, methods and materials used in electrotechnology work activities.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p> <p>Note:</p> <p>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</p>						

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to identify building techniques, methods and materials.

- 1.1 Instructions for identifying building techniques, methods and materials used in electrotechnology work are communicated and confirmed to ensure clear understanding.
- 1.2 OHS policies and procedures are communicated and confirmed to ensure they are understood as they apply to the carrying out of the work.
- 1.3 Tools, equipment and personnel protective equipment necessary for the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with established procedures.
- 1.4 Appropriate personnel are consulted to ensure the identification of building techniques, methods and materials used is coordinated effectively with others involved.
- 1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with established procedures.
- 1.6 Schedule for identifying building techniques, methods and materials used including practices for working safely are confirmed in accordance with instructions and requirements.

2 Identify building techniques, methods and materials.

- 2.1 OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents.
- 2.2 Schedule to identify building techniques, methods and materials used is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste.

- |   |  |  |  |
|---|--|--|--|
|   | 2.3  | Further instructions are sought from appropriate personnel in the event of unplanned happenings or conditions. |  |
|   | 2.4  | Ongoing checks of work quality are undertaken in accordance with instructions and requirements.                |  |
| 3 | Confirm building techniques, methods and materials used. | 3.1  | Final checks are made to ensure the identification of building techniques, methods and materials used conforms with instructions and to requirements.                |
|   |  | 3.2  | Appropriate personnel are notified of completion to identify techniques, methods and materials used.   |
|   |  | 3.3  | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
|   |  | 3.4  | Work area is cleaned up and made safe and sustainable energy practices are followed.   |
|   |  | 3.5  | Appropriate records are updated in accordance with instructions and established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and identifying building techniques, methods and materials used in electrotechnology work activities.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.2.40   | Electrotechnology Industry organisations and practises |
| 2.5.1.1  | Drawing Interpretation and Sketching                   |
| 2.7.1.1  | Electrotechnology building systems and materials       |
| 2.8.1.2  | Fundamental electrical principles                      |
| 2.8.2.1  | Direct current circuit principles                      |
| 2.8.8    | Electrotechnology science and materials                |
| 2.8.13   | Parts and components selection                         |
| 2.11.1   | Hand tools   |
| 2.11.2.1 | Power tools  |

2.11.4 Dismantling and assembly techniques

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to identifying building techniques, methods and materials used in electrotechnology work activities in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in

a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Identify building techniques, methods and materials used in electrotechnology work activities as described in 7) and including:
    - A Understanding work instruction.
    - B Obtaining and checking tools and equipment.
    - C Following work schedules.
    - D Returning tools and surplus resources as required.
    - E Updating work records.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency in identifying building techniques, methods and materials used in electrotechnology work activities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the

Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3; 2.4	1
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4; 3.1

## UEENEEE048A Carry out routine work activities in an electrotechnology environment

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers undertake scheduled routine work activities in the Electrotechnology Industry in an agreed time, to a quality standard and with a minimum of waste It encompasses working safely, applying knowledge of carrying out routine work activities in electrotechnology environments.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td>Reading</td> <td style="text-align: center;">3</td> <td>Writing</td> <td style="text-align: center;">3</td> <td>Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p> <p>Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.</li> </ol>						
<b>Competency Field</b>	4)						

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to undertake routine work activities.	<p>1.1 Instructions for preparing the work activity are communicated and confirmed to ensure clear understanding.</p> <p>1.2 OHS policies and procedures are communicated and confirmed to ensure they are understood as they apply to the carrying out of the work.</p> <p>1.3 Tools, equipment and personnel protective equipment necessary for the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with established procedures.</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved.</p> <p>1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with established procedures.</p> <p>1.6 Schedule of work including practices for working safely are confirmed in accordance with instructions and requirements.</p>
2 Carry out work as instructed.	<p>2.1 OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents.</p> <p>2.2 Schedule of work is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste.</p> <p>2.3 Knowledge of electrotechnology practices and electrical principles are applied to routine work activities.</p> <p>2.4 Further instructions are sought from appropriate personnel in the event of unplanned happenings or conditions.</p> <p>2.5 Ongoing checks of work quality are undertaken in accordance with instructions and requirements.</p>

- |   |                                      |     |  |
|---|--------------------------------------|-----|--|
| 3 | Check results of the completed work. | 3.1 | Final checks are made to ensure the work conforms with instructions and to requirements.   |
|   |                                      | 3.2 | Appropriate personnel are notified of completion of the work.  |
|   |                                      | 3.3 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
|   |                                      | 3.4 | Work area is cleaned up and made safe and sustainable energy practices are followed.   |
|   |                                      | 3.5 | Appropriate records are updated in accordance with instructions and established procedures.  |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out routine work activities in an electrotechnology environment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |  |
|---------|--|
| 2.2.40  | Electrotechnology Industry organisations and practises |
| 2.8.1.2 | Fundamental electrical principles                      |
| 2.8.2.1 | Direct current circuit principles                      |
| 2.18.1  | Occupational Health and Safety principles              |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out routine work activities in electrotechnology environments in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics

- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included

for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out routine work activities in an electrotechnology environment as described in 7) and including:
    - A Understanding work instruction.
    - B Obtaining and checking tools and equipment.
    - C Following work instructions.
    - D Returning tools and surplus resources as required.
    - E Updating work records.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out routine work activities in an electrotechnology environment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	1.4; 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 2.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3; 3.3	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:

		All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 3.3

## **UEENEEE049A Contribute to the operation of support plant and equipment used in electricity supply**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers contributing to the operation of support plant and equipment used in the Electricity Supply Industry for scheduled work, in an agreed time, to a quality standard and with a minimum of waste. It encompasses working safely, applying knowledge of contributing to the operation of support plant and equipment used in electricity supply.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.</p> <p>Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.</li> </ol>						

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to contribute to operating plant and equipment.

- 1.1 Instructions for preparing to contribute to operating plant and equipment are communicated and confirmed to ensure clear understanding.
- 1.2 OHS policies and procedures are communicated and confirmed to ensure they are understood as they apply to the carrying out of the work.
- 1.3 Tools, equipment and personnel protective equipment necessary for the work are identified, scheduled and checked to ensure they work correctly as intended and are safe to use in accordance with established procedures.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved.
- 1.5 Resources and materials needed to do the work are confirmed, scheduled and obtained in accordance with established procedures.
- 1.6 Schedule of work including practices for working safely are confirmed in accordance with instructions and requirements.

2 Contribute to operating plant and equipment.

- 2.1 OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents.
- 2.2 Plant and equipment is operated according to schedule of work to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste.
- 2.3 Further instructions are sought from appropriate personnel in the event of unplanned happenings or conditions.
- 2.4 Ongoing checks of work quality are undertaken in accordance with instructions and requirements.

- |   |   |     |  |
|---|---|-----|--|
| 3 | Complete contribution to operating plant and equipment. | 3.1 | Final checks are made to ensure the operation of plant and equipment conforms with instructions and to requirements.   |
|   |   | 3.2 | Appropriate personnel are notified of completion of the work in contributing to operating plant and equipment..  |
|   |   | 3.3 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
|   |   | 3.4 | Work area is cleaned up and made safe and sustainable energy practices are followed.   |
|   |   | 3.5 | Appropriate records are updated in accordance with instructions and established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the operation of support plant and equipment used in electricity supply.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.40 Electrotechnology organisations and practises
- 2.5.1.1 Drawing Interpretation and Sketching
- 2.8.1.2 Fundamental electrical principles
- 2.8.2.1 Direct current circuit principles
- 2.8.8 Electrotechnology science and materials
- 2.8.13 Parts and components selection
- 2.11.1 Hand tools
- 2.11.2.1 Power tools
- 2.11.4 Dismantling and assembly techniques
- 2.18.17 Powerline safety practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to contributing to the operation of support plant and equipment used in electricity supply in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Contribute to the operation of support plant and equipment used in electricity supply as described in 7) and including:
  - A Understanding work instruction.
  - B Obtaining and checking tools and equipment.
  - C Following work instruction.
  - D Operating plant and equipment safely and correctly.
  - E Returning tools and surplus resources as required.
  - F Updating work records.
  - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in contributing to the operation of support plant and equipment used in electricity supply.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.6; 2.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.1	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.3	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.2; 2.4; 3.1

## UEENEEE050A Undertake computations in an electrotechnology environment

### Unit Descriptor

1)

This unit covers computational and mathematical procedures to solve problems or to enhance given data. It encompasses working safely, applying knowledge of undertaking computations in electrotechnology environment.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite units for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.

### Competency Field

4)

Electrotechnology

### ELEMENT

### PERFORMANCE CRITERIA

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1	Prepare to undertake computations.	1.1	Computational activities are planned and prepared to ensure OHS policies and procedures are followed, with the work appropriately sequenced in accordance with requirements.
		1.2	Data for computations are obtained and verified in accordance with established procedures and to comply with requirements.
		1.3	Location in which activities are undertaken or data gathered is determined from job requirements.
		1.4	Materials/devices needed to carry out the computations are obtained in accordance with established procedures.
2	Undertake computations.	2.1	OHS policies and procedures for undertaking monitoring activities are followed.
		2.2	Computations are undertaken in accordance with requirements.
		2.3	Unplanned events or conditions are responded to in accordance with established procedure.
		2.4	Ongoing checks of the quality/accuracy of the work are undertaken in accordance with established procedures.
3	Complete monitoring activities.	3.1	Computations are verified and checked against estimates.
		3.2	Documentation/reports/computations are completed to ensure all requirements are met.
		3.3	Work completion is notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and undertaking computations in an electrotechnology environment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.15.1 Applied mathematical concepts

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to undertaking computations in an electrotechnology environment in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Undertake computations in an electrotechnology environment as described in 7) and including:
  - A Understanding transporting instructions.
  - B Checking transport details against job instruction.
  - C Obtaining relevant plant and equipment.
  - D Transporting plant and equipment in accordance with requirements.
  - E Undertaking computations in accordance with requirements.
  - F Notifying work completing.
  - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in undertaking computations in an electrotechnology environment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary

equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  All	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  3.2	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## UEENEEE051A Transport apparatus and materials

### Unit Descriptor

1)

This unit covers transport apparatus, plant accessories and materials. It encompasses safe working practices and following work processes that satisfy electrical principles for transporting apparatus and materials.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite units for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to Occupational Health and Safety and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

### Competency Field

4)

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Plan and prepare for the transport of apparatus and materials.	<p>1.1 Transport of apparatus and materials is planned and prepared to ensure OHS policies and procedures are followed, the work is appropriately sequenced in accordance with requirements.</p> <p>1.2 Appropriate personnel are consulted to ensure apparatus, accessories, plant, equipment and/or materials are appropriately identified, and checked against manufacturer transport instructions and requirements.</p> <p>1.3 Transport details of apparatus and materials are checked against job requirements.</p> <p>1.4 Plant needed to carry out the work is obtained in accordance with established procedures and checked for correct operation and safety.</p> <p>1.5 Where appropriate, team and individual work roles and responsibilities within the team are identified.</p> <p>1.6 Preparatory work is checked to ensure no damage has occurred and complies with requirements.</p>
2 Transport apparatus and materials.	<p>2.1 OHS policies and procedures for the transport of apparatus plant and materials are followed.</p> <p>2.2 Apparatus, plant and materials are transported in accordance with requirements, and manufacturer transport instructions without damage or distortion to the surrounding environment or services.</p> <p>2.3 Unplanned events or conditions are responded to in accordance with established procedure.</p> <p>2.4 Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are implemented.</p> <p>2.5 Ongoing checks of the work quality are undertaken in accordance with established procedures.</p>
3 Check and notify completion of work.	3.1 Final inspections are undertaken to ensure the transported apparatus and materials conforms to requirements.

- 3.2 Work completion is notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and transporting apparatus and materials.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.2.4 Problem solving techniques
- 2.2.5 Enterprise customer relations protocols
- 2.2.9 Enterprise stock control methods
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to transporting apparatus and equipment in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Transport apparatus and materials as described in 7) and including:
    - A Transporting apparatus.
    - B Transporting equipment.
    - C Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and  
specific  
resources for  
assessment**
**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in transporting apparatus and materials.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.4; 3.1 to 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: All	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.2; 2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  All	1

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## UEENEEE060A Provide solutions for uses of materials and thermodynamic effects

### Unit Descriptor

1)

This unit covers the solution for the appropriate selection and use of materials and thermodynamic effects relative to an engineering problem. It encompasses working safely, problem solving procedures, including using measuring instruments, applying appropriate theorems and providing solutions derived from measurements and calculations and justification for such solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE001A Apply OHS practices in the workplace

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE007A Use drawings, diagrams, schedules and manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher. It may also be suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the characteristics and

behaviour of material in an engineering environment.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to provide solutions for the uses of materials and thermodynamics.

- 1.1 OHS procedures for a given work area are obtained and understood
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of equipment and products that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices necessary for the work are obtained and checked for correct operation and safety.

2 Provide solutions for the uses of materials and thermodynamics.

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure active systems is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Systems are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Established methods are used to solve system problems from measure and calculated values, as they apply to materials and thermodynamics.
- 2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.

- |   |   |  |
|---|---|--|
|   | 2.6   | Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices with the minimum waste and rework. |
| 3 | Complete work and document solutions to discovered problem. | 3.1 OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2 Work site is cleaned and made safe in accordance with established procedures.  |
|   |   | 3.3 Justification for solutions used to solve system problems is documented.   |
|   |   | 3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions for uses of materials and thermodynamic effects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.21.9  | Material science                          |
| 2.21.10 | Thermodynamics                            |
| 2.18.1  | Occupational Health and Safety principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to analysing materials and thermodynamic effects relative to two different engineering applications.

Note.

Typical engineering applications are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide solutions for uses of materials and thermodynamic effects as described in 7) and including:
    - A Determining the characteristics and application of materials and the effects of thermodynamics.
    - B Using established problem solving methods.
    - C Taking relevant measurements accurately.
    - D Interpreting measured values appropriately.
    - E Providing effective solutions to system problems from measurements and calculations.
    - F Giving written justification of solutions provided.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing solutions for uses of materials and thermodynamic effects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	3

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.5

## UEENEEE061A Analyse static and dynamic parameters of equipment

### Unit Descriptor

1)

This unit covers the analysis of static and dynamic parameters of equipment associated with plant and machinery. It encompasses working safely, applying extensive knowledge of equipment operation and construction and its application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical machine problems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE001A	Apply OHS practices in the workplace
UEENEEE002A	Dismantle, assemble and fabricate electrotechnology components
UEENEEE007A	Use drawings, diagrams, schedules and manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to analyse static and dynamic parameters of machinery.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The extent of the machine analysis is determined from performance specifications and situation reports and in consultation with relevant persons.
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Strategies are identified to ensure efficient development and implementation of solution(s).

2 Analyse static and dynamic parameters of machinery.

- 2.1 OHS risk control work measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of statics and dynamics are applied to developing analytical solutions to machine parameters.
- 2.3 Parameters, specifications and performance requirements in relation to each machine analysed are obtained in accordance with established procedures.
- 2.4 Approaches to analysing machine parameters are carried out so as to provide the most effective solution.

	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.
	2.6	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.
3	Document and report the results of the analysis of static and dynamic parameters of machines.	
	3.1	Solutions to machine analysis are tested to determine their effectiveness and modified where necessary.
	3.2	Analysis is documented including details of all findings, calculations and assumptions.
	3.3	Analysis is reported to appropriate personnel to establish action to be taken based on findings.
	3.4	Justification for findings, and any actions to be undertaken in relation to the equipment, is documented for inclusion in work/project or development records in accordance with professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and analysing static and dynamic parameters of equipment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.21.4 Statics and dynamics

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to analysing static and dynamic parameters on at least two different types of machine.

Note.

Typical machines are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## **Critical aspects of evidence required to**

### **8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Analyse static and dynamic parameters of equipment as described in 7) and including:
    - A Understanding the operation of machines.
    - B Forming effective strategies for analysing machine performance.
    - C Obtaining machine parameters, specifications and performance requirements appropriate to each situation.
    - D Testing the results of the analysis.
    - E Documenting instruction for implementing any actions resulting from the analysis that incorporates risk control measure to be followed.
    - F Documenting justification of actions to be implemented in accordance with professional standards.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in analysing static and dynamic parameters of equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.2; 2.3	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:

		All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.5

## UEENEEE062A **Select drive components for equipment design**

### Unit Descriptor

1)

This unit covers the selection of drive components based on design concepts for the operation of plant and equipment. It encompasses working safely, applying extensive knowledge of drive component operation and characteristics, their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical drive components are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE061A Analyse static and dynamic parameters of equipment

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Electrotechnology

**ELEMENT****PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to select drive components.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 The extent of the drive selection is determined from performance specifications and situation reports and in consultation with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Strategies are identified to ensure efficient development and implementation of solution(s).</p>
2 Select drive components	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of drive components is applied to engineering design concepts.</p> <p>2.3 Parameters, specifications and performance requirements in relation to drive components are established in accordance with established procedures.</p> <p>2.4 Drive components are selected to provide the most effective solution(s).</p> <p>2.5 Unplanned events are dealt with safely and effectively and consistent with regulatory requirements and enterprise policy.</p> <p>2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.</p>

- |   |   |     |   |
|---|---|-----|---|
| 3 | Document and report the results of the selection of drive components relative to engineering design concepts. | 3.1 | Selection of drive components is tested to determine their effectiveness and modified where necessary.  |
|   |   | 3.2 | Selection is documented including details of all findings, calculations and assumptions.  |
|   |   | 3.3 | Selection is reported to appropriate personnel to establish action to be taken based on findings.   |
|   |   | 3.4 | Justification for selection and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with professional standards. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and selecting drive components for equipment design.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.21.2 Mechanical drives and engineering

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to selection of two different types of drive components.

Note.

Typical drive components are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with mechanical drive malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Selecting drive components for equipment design as described in 7) and including:
    - A Understanding drive components relative to engineering design concepts.
    - B Forming effective strategies for selecting drive components.
    - C Obtaining drive component parameters, specifications and performance requirements appropriate to each situation.
    - D Testing the results of the selection.
    - E Documenting instruction for implementing any actions resulting from the selection that incorporates risk control measure to be followed.
    - F Documenting justification of actions to be

implemented in accordance with professional standards.

- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in selecting drive components for equipment design.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE063A Analyse materials for suitability in equipment

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2,

Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

### **Skills Enabling Employment**

#### **8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>

1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEE063A Analyse materials for suitability in equipment

### Unit Descriptor

1)

This unit covers the analysis of materials for their suitable use in the construction of equipment. It encompasses working safely, apply extensive knowledge of materials and their properties as they relate to equipment construction and operation, gathering and analysing data, applying problem solving techniques, developing and documenting findings, solutions and providing alternatives.

Note.

Typical machine problems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE0061A Analyse static and dynamic parameters of equipment

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Electrotechnology

**ELEMENT****PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to analyse materials.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 The extent of the machine analysis is determined from performance specifications and situation reports and in consultation with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Strategies are identified to ensure efficient development and implementation of solution(s).</p>
2 Analyse materials.	<p>2.1 OHS risk control work measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of materials is applied to developing machine parts.</p> <p>2.3 Characteristics, specifications and performance requirements in relation to materials are obtained in accordance with established procedures.</p> <p>2.4 Approaches to analysing materials are carried out so as to provide the most effective solution.</p> <p>2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.</p> <p>2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.</p>
3 Document and report the results of the materials analysis.	<p>3.1 Solutions to materials analysis are tested to determine their effectiveness and modified where necessary.</p> <p>3.2 Analysis is reported to appropriate personnel to establish action to be taken based on findings.</p>

- 3.3 Analysis is reported to appropriate personnel to establish action to be taken based on findings.
- 3.4 Justification for findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and analysing materials for suitability in equipment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.21.3 Materials and strengths of materials
- 2.18.1 Occupational health and safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to analysing 4 different types of materials.

Note.

Typical materials are those encountered in meeting performance requirements and compliance standards, characteristics and operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to

include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Analyse materials for suitability in equipment as described in 7) and including:
    - A Understanding the material properties.
    - B Forming effective strategies for analysing machine performance.
    - C Obtaining machine characteristics, specifications and performance requirements appropriate to each situation.
    - D Testing the results of the analysis.
    - E Documenting instruction for implementing any actions resulting from the analysis that incorporates risk control measure to be followed.
    - F Documenting justification of actions to be implemented in accordance with professional standards.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in analysing materials for suitability in equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE062A Select drive components for equipment design

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5
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## UEENEEE064A Design machine drives and production layout plans

### Unit Descriptor

1)

This unit covers the design of machine drives and the layout of machinery for the efficient production of goods produced by automated equipment. It encompasses working safely, applying extensive knowledge of machine drives and equipment layout arrangements, their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical machine drives and production layout plans are those encountered in meeting performance requirements and compliance standards, production requirements and efficient use of materials and human resources.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE062A	Select drive components for equipment design
UEENEEE063A	Analyse materials for suitability in equipment
UEENEEE026A	Provide solutions to pneumatic/hydraulic system operations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Electrotechnology

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to design machines and production layout plans.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The extent of the machine design and production layout plans are determined from performance specifications and situation reports and in consultation with relevant persons
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Strategies are identified to ensure efficient development and implementation of solution(s).

2 Design machines and production layout plans

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of machine designs and production layout plans is applied to engineering design concepts.
- 2.3 Parameters, specifications and performance requirements in relation to machine design and production layout plan are established in accordance with established procedures.
- 2.4 Approaches to selecting machine designs and production layout plans are carried out so as to provide the most effective solution.
- 2.5 Unplanned events are dealt with safely and effectively and consistent with regulatory requirements and enterprise policy.

	2.6	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards	
3	Document and report the results of the machine design and production layout plans relative to engineering design concepts.	3.1	Machine design and production layout plan is tested to determine their effectiveness and modified where necessary.
		3.2	Design and layout is documented including details of all findings, calculations and assumptions.
		3.3	Design and layout is reported to appropriate personnel to establish action to be taken based on findings.
		3.4	Justification for design and layout and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing machine drives and production layout plans.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.21.1 Machine design and positioning

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to selection of two different types of machine design and two different production layout plans.

Note.

Typical machine designs and production layout plans are those encountered in meeting performance requirements and compliance standards, the initial design or revising a machine operating parameters and dealing with efficient production processes.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design machine drives and production layout plans as described in 7) and including:
    - A Understanding machine design and production layout issue relative to engineering design concepts.
    - B Forming effective strategies for machine designs and plant layout.
    - C Obtaining parameters, specifications and performance requirements appropriate to each situation.
    - D Testing the results of the design and/or layout.
    - E Documenting instruction for implementing any actions resulting from the design and layout that incorporate risk control measure to be followed.
    - F Documenting justification of actions to be implemented in accordance with professional standards.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing machine drives and production layout plans.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## **UEENEEE070A Write specifications for computer systems engineering projects**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers developing requirement to be incorporated into the writing of specifications for computer systems engineering projects. It encompasses determining the safety requirements to be met, establishing client expectations, ensuring cost effective solutions are pursued and documenting design and technical requirements.</p>						
<b>Prerequisite Unit(s)</b>	<b>2)</b>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit should be assessed in conjunction with other technical units in a qualification.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Electrotechnology</p>						

### **ELEMENT**

### **PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare specification requirements.	1.1	OHS processes and procedures for a given work area are identified, obtained and understood.
	1.2	Established techniques for specification writing are reviewed are adopted in accordance with organisation policies.
	1.3	The scope of the specification is established using a formal evaluation/survey processes.
	1.4	Criteria from other related works impacting on the specification are determined from other relevant documentation, site visits and/or discussion with appropriate person(s).
2 Write specification.	2.1	Specification is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.
	2.2	Specification is developed in collaboration with all relevant design professionals and contractors involved in the project.
	2.3	Competent persons required for the project are identified and their roles specified in the specification.
	2.4	Specification is reviewed against all inputs and adjusted to rectify any anomalies.
	2.5	Specification is developed in accordance with organisation policies and procedures.
3 Approval of specification is obtained.	3.1	Specification is presented and discussed with person(s) of higher authority.
	3.2	Alterations to the specification resulting from the discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.
	3.3	Specification is finalised and approval obtained from appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

**6)** This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and writing specifications for computer systems engineering projects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.11.2 Specification development
- 2.2.19 Customer/client relations
- 2.2.20 Computer use basics
- 2.2.25 Research concepts
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing a specifications for at least one medium sized computer systems engineering project

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### **Overview of Assessment**

##### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Write specifications for computer systems engineering projects as described in 7) and including:
  - A Establishing the scope and parameters of the specification.
  - B Determining the impact of other related works.
  - C Developing the specification incorporating scenarios and all requirements.
  - D Identifying competencies required for the specification.
  - E Writing specifications.
  - F Negotiating alterations to the proposed specification successfully.
  - G Obtaining approval of the final specification.
  - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in writing specifications for computer systems engineering projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary

equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**  
Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  All	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4;	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2

## UEENEEE071A Write specifications for electrical engineering projects

### Unit Descriptor

1)

This unit covers developing requirement to be incorporated into the writing of specifications for electrical engineering projects. It encompasses determining the safety requirements to be met, establishing client expectations, ensuring cost effective solutions are pursued and documenting design and technical requirements.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit should be assessed in conjunction with other technical units in a qualification.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships

### Competency Field

4)

Electrotechnology

## ELEMENT

## PERFORMANCE CRITERIA

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>	
<p><b>1 Prepare specification requirements.</b></p>	<p>1.1</p>	<p>OHS processes and procedures for a given work area are identified, obtained and understood.</p>
	<p>1.2</p>	<p>Established techniques for specification writing are reviewed are adopted in accordance with organisation policies.</p>
	<p>1.3</p>	<p>The scope of the specification is established using a formal evaluation/survey processes.</p>
	<p>1.4</p>	<p>Criteria from other related works impacting on the specification are determined from other relevant documentation, site visits and/or discussion with appropriate person(s).</p>
<p><b>2 Write specification.</b></p>	<p>2.1</p>	<p>Specification is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.</p>
	<p>2.2</p>	<p>Specification is developed in collaboration with all relevant design professionals and contractors involved in the project.</p>
	<p>2.3</p>	<p>Competent persons required for the project are identified and their roles specified in the specification.</p>
	<p>2.4</p>	<p>Specification is reviewed against all inputs and adjusted to rectify any anomalies.</p>
	<p>2.5</p>	<p>Specification is developed in accordance with organisation policies and procedures.</p>
<p><b>3 Approval of specification is obtained.</b></p>	<p>3.1</p>	<p>Specification is presented and discussed with person(s) of higher authority.</p>
	<p>3.2</p>	<p>Alterations to the specification resulting from the discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.</p>
	<p>3.3</p>	<p>Specification is finalised and approval obtained from appropriate person(s).</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and writing specifications for electrical engineering projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.11.2 Specification development
- 2.2.19 Customer/client relations
- 2.2.20 Computer use basics
- 2.2.25 Research concepts
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing a specifications for at least one medium sized electrical engineering project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Write specifications for electrical engineering projects as described in 7) and including:
  - A Establishing the scope and parameters of the specification.
  - B Determining the impact of other related works.
  - C Developing the specification incorporating scenarios and all requirements.
  - D Identifying competencies required for the specification.
  - E Writing specifications.
  - F Negotiating alterations to the proposed specification successfully.
  - G Obtaining approval of the final specification.
  - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in writing specifications for electrical engineering projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary

equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: All	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.2	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2

## **UEENEEE072A Write specifications for electronics and communications engineering projects**

### **Unit Descriptor**

**1)**

This unit covers developing requirement to be incorporated into the writing of specifications for electronics and communication engineering projects. It encompasses determining the safety requirements to be met, establishing client expectations, ensuring cost effective solutions are pursued and documenting design and technical requirements.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit should be assessed in conjunction with other technical units in a qualification.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships

### **Competency Field**

**4)**

Electrotechnology

## **ELEMENT**

## **PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare specification requirements.	1.1	OHS processes and procedures for a given work area are identified, obtained and understood.
	1.2	Established techniques for specification writing are reviewed and adopted in accordance with organisation policies.
	1.3	The scope of the specification is established using a formal evaluation/survey processes.
	1.4	Criteria from other related works impacting on the specification are determined from other relevant documentation, site visits and/or discussion with appropriate person(s).
2 Write specification.	2.1	Specification is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.
	2.2	Specification is developed in collaboration with all relevant design professionals and contractors involved in the project.
	2.3	Competent persons required for the project are identified and their roles specified in the specification.
	2.4	Specification is reviewed against all inputs and adjusted to rectify any anomalies.
	2.5	Specification is developed in accordance with organisation policies and procedures.
3 Approval of specification is obtained.	3.1	Specification is presented and discussed with person(s) of higher authority.
	3.2	Alterations to the specification resulting from the discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.
	3.3	Specification is finalised and approval obtained from appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

**6)** This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and writing specifications for electronics and communications engineering projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.11.2 Specification development
- 2.2.19 Customer/client relations
- 2.2.20 Computer use basics
- 2.2.25 Research concepts
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing a specification for at least one medium sized electrical engineering project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### **Overview of Assessment**

##### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Write specifications for electronics and communications engineering projects as described in 7) and including:
  - A Establishing the scope and parameters of the specification.
  - B Determining the impact of other related works.
  - C Developing the specification incorporating scenarios and all requirements.
  - D Identifying competencies required for the specification.
  - E Writing specifications.
  - F Negotiating alterations to the proposed specification successfully.
  - G Obtaining approval of the final specification.
  - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in writing specifications for electronics and communications engineering projects

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary

equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**  
Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.4 to 1.4; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  All	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2

## **UEENEEE073A Write specifications for refrigeration and air conditioning engineering projects**

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers developing requirement to be incorporated into the writing of specifications for refrigeration and air conditioning engineering projects. It encompasses determining the safety requirements to be met, establishing client expectations, ensuring cost effective solutions are pursued and documenting design and technical requirements.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit should be assessed in conjunction with other technical units in the qualification.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Electrotechnology</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare specification requirements.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established techniques for specification writing are reviewed and adopted in accordance with organisation policies.</p> <p>1.3 The scope of the specification is established using a formal evaluation/survey processes.</p> <p>1.4 Criteria from other related works impacting on the specification are determined from other relevant documentation, site visits and/or discussion with appropriate person(s).</p>
2 Write specification.	<p>2.1 Specification is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.</p> <p>2.2 Specification is developed in collaboration with all relevant design professionals and contractors involved in the project.</p> <p>2.3 Competent persons required for the project are identified and their roles specified in the specification.</p> <p>2.4 Specification is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>2.5 Specification is developed in accordance with organisation policies and procedures.</p>
3 Approval of specification is obtained.	<p>3.1 Specification is presented and discussed with person(s) of higher authority.</p> <p>3.2 Alterations to the specification resulting from the discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.</p> <p>3.3 Specification is finalised and approval obtained from appropriate person(s).</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and writing specifications for refrigeration and air conditioning engineering projects.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.19	Customer/client relations
2.2.20	Computer use basics
2.2.11.2	Specification development
2.2.25	Research concepts
2.18.8.2	Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing a specification for at least one medium sized electrical engineering project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in

some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Write specifications for refrigeration and air conditioning engineering projects as described in 7) and including:
    - A Establishing the scope and parameters of the specification.
    - B Determining the impact of other related works.
    - C Developing the specification incorporating scenarios and all requirements.
    - D Identifying competencies required for the specification.
    - E Writing specifications.
    - F Negotiating alterations to the proposed specification successfully.
    - G Obtaining approval of the final specification.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in writing specifications for refrigeration and air conditioning engineering projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: All	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	3

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2

## UEENEEE074A Write specifications for renewable energy engineering projects

### Unit Descriptor

1)

This unit covers developing requirement to be incorporated into the writing of specifications for renewable energy engineering projects. It encompasses determining the safety requirements to be met, establishing client expectations, ensuring cost effective solutions are pursued and documenting design and technical requirements.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit should be assessed in conjunction with other technical units in a qualification.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships

### Competency Field

4)

Electrotechnology

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare specification requirements.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established techniques for specification writing are reviewed and adopted in accordance with organisation policies.</p> <p>1.3 The scope of the specification is established using a formal evaluation/survey processes.</p> <p>1.4 Criteria from other related works impacting on the specification are determined from other relevant documentation, site visits and/or discussion with appropriate person(s).</p>
2 Write specification.	<p>2.1 Specification is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.</p> <p>2.2 Specification is developed in collaboration with all relevant design professionals and contractors involved in the project.</p> <p>2.3 Competent persons required for the project are identified and their roles specified in the specification.</p> <p>2.4 Specification is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>2.5 Specification is developed in accordance with organisation policies and procedures.</p>
3 Approval of specification is obtained.	<p>3.1 Specification is presented and discussed with person(s) of higher authority.</p> <p>3.2 Alterations to the specification resulting from the discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.</p> <p>3.3 Specification is finalised and approval obtained from appropriate person(s).</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and writing specifications for refrigeration and air conditioning engineering projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.11.2	Specification development
2.2.19	Customer/client relations
2.2.20	Computer use basics
2.2.25	Research concepts
2.18.8.2	Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing a specification for at least one medium sized electrical engineering project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Write specifications for renewable energy engineering projects as described in 7) and including:
    - A Establishing the scope and parameters of the specification.
    - B Determining the impact of other related works.
    - C Developing the specification incorporating scenarios and all requirements.
    - D Identifying competencies required for the specification.
    - E Writing specifications.
    - F Negotiating alterations to the proposed specification successfully.
    - G Obtaining approval of the final specification.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

es required to assess this unit are listed above in context of assessment’, which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in writing specifications for renewable energy engineering projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: All	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	3

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2

## UEENEEE075A Write specifications for industrial electronics and control projects

### Unit Descriptor

1)

This unit covers developing requirement to be incorporated into the writing of specifications for industrial electronics and control projects. It encompasses determining the safety requirements to be met, establishing client expectations, ensuring cost effective solutions are pursued and documenting design and technical requirements.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit should be assessed in conjunction with other technical units in a qualification.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships

### Competency Field

4)

Electrotechnology

## ELEMENT

## PERFORMANCE CRITERIA

<p><b>5) Elements describe the essential outcomes of a unit of competency</b></p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>	
<p><b>1 Prepare specification requirements.</b></p>	<p>1.1</p>	<p>OHS processes and procedures for a given work area are identified, obtained and understood.</p>
	<p>1.2</p>	<p>Established techniques for specification writing are reviewed and adopted in accordance with organisation policies.</p>
	<p>1.3</p>	<p>The scope of the specification is established using a formal evaluation/survey processes.</p>
	<p>1.4</p>	<p>Criteria from other related works impacting on the specification are determined from other relevant documentation, site visits and/or discussion with appropriate person(s).</p>
<p><b>2 Write specification.</b></p>	<p>2.1</p>	<p>Specification is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.</p>
	<p>2.2</p>	<p>Specification is developed in collaboration with all relevant design professionals and contractors involved in the project.</p>
	<p>2.3</p>	<p>Competent persons required for the project are identified and their roles specified in the specification.</p>
	<p>2.4</p>	<p>Specification is reviewed against all inputs and adjusted to rectify any anomalies.</p>
	<p>2.5</p>	<p>Specification is developed in accordance with organisation policies and procedures.</p>
<p><b>3 Approval of specification is obtained.</b></p>	<p>3.1</p>	<p>Specification is presented and discussed with person(s) of higher authority.</p>
	<p>3.2</p>	<p>Alterations to the specification resulting from the discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.</p>
	<p>3.3</p>	<p>Specification is finalised and approval obtained from appropriate person(s).</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and writing specifications for industrial electronics and control projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.11.2 Specification development
- 2.2.19 Customer/client relations
- 2.2.20 Computer use basics
- 2.2.25 Research concepts
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing a specification for at least one medium sized industrial electronics and control project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Write specifications for industrial electronics and control projects as described in 7) and including:
  - A Establishing the scope and parameters of the specification.
  - B Determining the impact of other related works.
  - C Developing the specification incorporating scenarios and all requirements.
  - D Identifying competencies required for the specification.
  - E Writing specifications.
  - F Negotiating alterations to the proposed specification successfully.
  - G Obtaining approval of the final specification.
  - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in writing specifications for renewable energy engineering projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary

equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: All	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.2	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2

## UEENEEE077A Write specifications for automated systems projects

### Unit Descriptor

1)

This unit covers developing requirement to be incorporated into the writing of specifications for automated systems projects. It encompasses determining the safety requirements to be met, establishing client expectations, ensuring cost effective solutions are pursued and documenting design and technical requirements.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit should be assessed in conjunction with other technical units in a qualification.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Electrotechnology

### ELEMENT

### PERFORMANCE CRITERIA

<b>5)</b> Elements describe the essential outcomes of a unit of competency		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare specification requirements.	1.1	OHS processes and procedures for a given work area are identified, obtained and understood.
	1.2	Established techniques for specification writing are reviewed and adopted in accordance with organisation policies.
	1.3	The scope of the specification is established using a formal evaluation/survey processes.
	1.4	Criteria from other related works impacting on the specification are determined from other relevant documentation, site visits and/or discussion with appropriate person(s).
2 Write specification.	2.1	Specification is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.
	2.2	Specification is developed in collaboration with all relevant design professionals and contractors involved in the project.
	2.3	Competent persons required for the project are identified and their roles specified in the specification.
	2.4	Specification is reviewed against all inputs and adjusted to rectify any anomalies.
	2.5	Specification is developed in accordance with organisation policies and procedures.
3 Approval of specification is obtained.	3.1	Specification is presented and discussed with person(s) of higher authority.
	3.2	Alterations to the specification resulting from the discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.
	3.3	Specification is finalised and approval obtained from appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

**6)** This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and writing specifications for automated systems projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.11.2	Specification development
2.2.19	Customer/client relations
2.2.20	Computer use basics
2.2.25	Research concepts
2.18.8.2	Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing a specification for at least one medium sized automated systems project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Write specifications for automated systems projects as described in 7) and including:
  - A Establishing the scope and parameters of the specification.
  - B Determining the impact of other related works.
  - C Developing the specification incorporating scenarios and all requirements.
  - D Identifying competencies required for the specification.
  - E Writing specifications.
  - F Negotiating alterations to the proposed specification successfully.
  - G Obtaining approval of the final specification.
  - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency in writing specifications for automated systems projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which

is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: All	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:	

	2.1 to 3.2	2
--	------------	---

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1F  
F – Data and Voice Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## **UEENEEF001A Lay and connect cabling for direct access to telecommunication services**

### **Unit Descriptor**

**1)**

This unit covers the installation and termination of telecommunications cabling in buildings and premises. It encompasses working safely and to Australian Communications and Media Authority's 'restricted' Cabling Provider Rule, installing telephone line, two-pair (quad) cables, terminating on socket outlets, testing and compliance checks and completing cabling documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE006A Solve problems in data and voice communications circuits

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, diagrams, schedules and manuals

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
---------	---	---------	---	----------	---

### **Application of the Unit**

**3)**

This unit applies to customer cabling that terminates directly on permitted sockets and the like, and to the installation, maintenance and modification of indoor, external, underground cabling. Customer cabling, for the purpose of this standard, may be used to connect devices for a range of applications, including for example: telecommunications (phones and facsimile), data, including video and multimedia, security and alarms, and fire protection.

**Licence to practise 3.1)**

This unit meets the minimum ACMA ‘prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved’. Therefore, skills and knowledge described in this unit may only be practised under the requirements set out in ACMA ‘Restricted’ Cabling Provider Rule.

Practice of this competency standard unit is also subject to regulations directly related to occupational health and safe and contracts of training where they apply.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Data and Voice Communications

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

- |   |   |
|---|---|
| <p>1 Prepare to lay and connect cabling for direct access to telecommunication services</p> | <p>1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.</p> <p>1.2 Health and safety risks are identified and established risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Remote power feeding is identified and established risk control measures prepared.</p> <p>1.4 The nature and location of the work is determined from documentation or discussions with appropriate person(s) to establish the scope of work to be undertaken.</p> <p>1.5 Cable routes are planned within the constraints of the building structure, significant and regulations.</p> |
|---|---|

- 1.6 Earthing requirements are determined with consideration of existing earthing arrangements, where applicable and of cable system earth upper and lower resistance limitations.
  - 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
  - 1.8 Sources of materials that may be required for the work are established in accordance with established routines and procedures.
  - 1.9 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
- 2 Lay and connect cabling for direct access to telecommunication services
- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
  - 2.2 Installed support structure is checked to ensure cable will not be exposed to damage during installation and general operation.
  - 2.3 Sufficient excess is allowed at cable ends to facilitate termination.
  - 2.4 Telecommunication outlet ends of cable are uniquely labelled to match identifier at originating location.
  - 2.5 Cable is placed and secured to maintain safety and interference segregation in accordance with legislative and industry standards.
  - 2.6 Cable ties not tightened to the point of causing cable sheath damage or transmission impairment are trimmed flush to prevent risk of personal damage.
  - 2.7 Cables installed as catenaries or supported by catenaries in external environment shall meet minimum above ground clearances and clearances from hazardous electrical services as per AS/ACIF S009.
  - 2.8 Cables installed underground shall meet minimum depth of cover and segregation from hazardous electrical and other services as per AS/ACIF S009.
  - 2.9 Over-voltage protection devices are fitted to all cable pairs, where required, to suppress voltage surges with the devices protectively earthed. in accordance with AS/ACIF S009.

- 2.10 TRC/CES/Earth wire insulation is protected against damage and TRC/CES and protective earths segregated in accordance with relevant industry and legislative standards AS/ACIF S009.
- 2.11 Procedures for referring non-routine events to immediate supervisor for directions are followed.
- 2.12 Cabling is installed efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or services.
- 2.13 Routine quality checks are carried out to ensure cabling complies with requirements.
- 3. Terminate and test cables and earth wires.
  - 3.1 Established OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Cable sheath removed to allow for correct termination length and without damage to underlying conductors and their insulation.
  - 3.3 Network termination device is installed in accordance to manufacturer specifications and cable pairs neatly and sequentially fanned for termination.
  - 3.4 Conductors are terminated in accordance with recommended colour code sequence using appropriate termination tools in the manufacturer specified manner.
  - 3.5 Cable shield (if applicable) is earthed to manufacturer specifications and relevant industry codes of practice including AS/ACIF S009.
  - 3.6 Visual inspection is undertaken to confirm termination colour code sequence has been followed prior to end-to-end testing of wire and pair termination integrity.
  - 3.7 Cable pairs are tested and clearly labelled to provide an accurate identification in accordance with requirements.
  - 3.8 TRC/CES /Earth wires are terminated with connectors recommended by manufacturers in accordance with relevant industry codes of practice including AS/ACIF S009.
  - 3.9 TRC/CES /Earth wire continuity is maintained through out and interface requirements with electrical systems are observed.

- 3.10 TRC/CES /Earthing installation is tested for continuity, insulation resistance and conductive resistance as per relevant industry standards including AS/ACIF S009.
  - 3.11 Compatibility of alterations with existing systems is confirmed and new work tested both in isolation and when integrated with existing systems.
  - 3.12 Procedures for referring non-routine events to immediate supervisor for directions are followed.
  - 3.13 Cabling is terminated efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or services.
  - 3.14 Routine quality checks are carried out and defects rectified to ensure cabling comply with requirements.
- 4 Complete cabling work, records and reporting.
- 4.1 OHS work completion risk control measures and procedures are followed.
  - 4.2 Work site is cleaned and made safe in accordance with established procedures.
  - 4.3 Cabling completion advice is documented and reported in accordance with requirements.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and laying and connecting cabling for direct access to telecommunication services. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.1.1 Telecommunications CPR regulations and installations
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to cabling installations applicable to single telephone line (two-pair) and directly connected to telephone sockets. It includes terminating, placing of cables on support structures and building faces, securing cables correctly for above locations, avoiding cable damage, reading and interpreting drawings,

conducting and interpreting cable test results, applying standards and regulations, and completing the required documentation.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1..

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Laying and connecting cabling for direct access to telecommunication services as described in 7) and including:
    - A Terminating at both network termination device and at least two different outlet types and locations
    - B Placing of cables on support structures and building faces for both internal and external locations
    - C Securing cables correctly for above locations
    - D Avoiding cable damage such as crushing, burning, kinking, sheath twist, cutting and nicking, bending radius
    - E Reading and interpreting drawings related to outlet and service entry location
    - F Conducting and interpreting cable test results
    - G Correctly interpreting and applying standards and

regulations

H Completing the required documentation

I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in laying and connecting cabling for direct access to telecommunication services.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, diagrams, schedules and manuals

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.2; 1.4; 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.7	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.6	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.13; 3.2 to 3.6	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
-----------------------	------------------------

1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.16; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11; 3.12

## **UEENEEF002A Lay and connect cables for multiple access to telecommunication services**

### **Unit Descriptor**

**1)**

This unit covers the laying and termination of telecommunications cabling in buildings and premises. It encompasses working safely and to Australian Communications and Media Authority's 'Open' Cabling Provider Rule, installing multiple telephone line, multi-pair cables, backbone cabling, terminating in socket outlets, termination modules and distributors, testing and compliance checks and completing cabling documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE004A Solve problems in multiple path d.c. circuits

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, diagrams, schedules and manuals

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
---------	---	---------	---	----------	---

### **Application of the Unit**

**3)**

This unit applies to customer cabling terminated on distributors and to the installation, maintenance and modification of indoor, external, underground cabling. Customer cabling, for the purpose of this standard, may be used to connect devices for a range of applications, including for example: telecommunications (phones and facsimile), data including video and multimedia, security and alarms, and fire protection.

**Licence to practise 3.1)**

This unit meets the minimum ACMA ‘prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved’. Therefore, skills and knowledge described in this unit may only be practised under the requirements set out in ACMA ‘Open’ Cabling Provider Rule.

Practice of this competency standard unit is also subject to regulations directly related to occupational health and safe and contracts of training where they apply.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Data and Voice Communications

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

- |   |                                  |     |   |
|---|----------------------------------|-----|---|
| 1 | Prepare to lay or alter cabling. | 1.1 | OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.   |
|   |                                  | 1.2 | Health and safety risks are identified and established risk control measures and procedures are followed in preparation for the work.                             |
|   |                                  | 1.3 | Remote power feeding is identified and established risk control measures prepared.  |
|   |                                  | 1.4 | The nature and location of the work is determined from documentation or in discussion with appropriate person(s) to establish the scope of work to be undertaken. |
|   |                                  | 1.5 | Cable routes are planned within the constraints of the building structure, significant and regulations.   |

- 1.6 Earthing requirements are determined with consideration of existing earthing arrangements, where applicable and of cable system earth upper and lower resistance limitations.
  - 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
  - 1.8 Sources of materials that may be required for the work are established in accordance with established routines and procedures.
  - 1.9 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
- 2 Lay or alter cabling.
- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
  - 2.2 Installed support structure is checked to ensure cable will not be exposed to damage during installation and general operation.
  - 2.3 Catenary supports are secured to building structure and tensioned where necessary to ensure cable weight can be carried in operating conditions with interference and safety segregation maintained including adherence to AS/ACIF S009.
  - 2.4 Protective earthing of metal work is installed in accordance with requirements and to industry standards.
  - 2.5 Cables/wires are handled in accordance with manufacturer's application specifications including tension and bending stress requirements.
  - 2.6 Sufficient excess is allowed at cable ends to facilitate termination.
  - 2.7 Telecommunication outlet ends of cable are uniquely labelled to match identifier at originating location.
  - 2.8 Cable is placed and secured to maintain safety and interference segregation in accordance with legislative and industry standards.
  - 2.9 Cable ties not tightened to the point of causing cable sheath damage or transmission impairment are trimmed flush to prevent risk of personal damage.

- 2.10 Cables installed as catenaries or supported by catenaries in external environment shall meet minimum above ground clearances and clearances from hazardous electrical services as per AS/ACIF S009.
- 2.11 Cables installed underground shall meet minimum depth of cover and segregation from hazardous electrical and other services as per AS/ACIF S009.
- 2.12 Over-voltage protection devices are fitted to all cable pairs, where required, to suppress voltage surges with the devices protectively earthed in accordance with AS/ACIF S009.
- 2.13 TRC/CES/Earth wire insulation is protected against damage and TRC/CES and protective earths segregated in accordance with relevant industry and legislative standards AS/ACIF S009.
- 2.14 Procedures for referring non-routine events to immediate supervisor for directions are followed.
- 2.15 Cabling is installed efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or services.
- 2.16 Routine quality checks are carried out to ensure cabling complies with requirements.
- 3. Terminate and test cables and earth wires.
  - 3.1 Established OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Cable sheath removed to allow for correct termination length and without damage to underlying conductors and their insulation.
  - 3.3 Terminating modules are installed in accordance to manufacturer specifications and cable pairs neatly and sequentially fanned for termination.
  - 3.4 Conductors are terminated in accordance with recommended colour code sequence using appropriate termination tools in the manufacturer's specified manner.
  - 3.5 Cable shield (if applicable) is earthed to manufacturer specifications and relevant industry codes of practice including AS/ACIF S009.

- 3.6 Visual inspection is undertaken to confirm termination colour code sequence has been followed prior to end-to-end testing of wire and pair termination integrity.
- 3.7 Cable pairs are tested and clearly labelled to provide an accurate identification in accordance with requirements.
- 3.8 TRC/CES/Earth wires are terminated with connectors recommended by manufacturers in accordance with relevant industry codes of practice including AS/ACIF S009.
- 3.9 TRC/CES /Earth wire continuity is maintained through out and interface requirements with electrical systems are observed.
- 3.10 TRC/CES /Earthing installation is tested for continuity, insulation resistance and conductive resistance as per relevant industry standards including AS/ACIF S009.
- 3.11 Earthing system is labelled in accordance with requirements.
- 3.12 Compatibility of alterations with existing systems is confirmed and new work tested both in isolation and when integrated with existing systems.
- 3.13 Procedures for referring non-routine events to immediate supervisor for directions are followed.
- 3.14 Cabling is terminated efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or services.
- 3.15 Routine quality checks are carried out and a defect rectified to ensure cabling complies with requirements.
- 4 Complete cabling work, records and reporting.
  - 4.1 OHS work completion risk control measures and procedures are followed.
  - 4.2 Work site is cleaned and made safe in accordance with established procedures.
  - 4.3 Record sheets and plans of cable location, type and infrastructure are accurately created or updated and stored in accordance with customer requirements.

- 4.4 Cable pair record books are created or updated to provide an accurate record of pair locations, inter-connections and usage in accordance with industry codes of practice and AS/ACIF S009.
- 4.5 Cabling completion advice is documented and reported in accordance with requirements.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and laying and connecting cables for multiple access to telecommunication services. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.1 Cable protection and support
- 2.1.2 Cable types and applications
- 2.1.3 Cables in buildings, structures and premises
- 2.1.6.1 Telecommunication cable and conductor terminations
- 2.4.1.2 Telephone system fundamentals
- 2.4.2.1 Telecommunication earthing and protection
- 2.5.7 Technical standards, regulations and codes for telecommunications cabling
- 2.5.11 Environmental and heritage awareness
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to cable laying and connecting applicable to larger commercial and industry installations involving many lines, multi-pair cables, backbone cabling, multi-story buildings and more complicated termination modules and distributors.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

---

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Lay and connect cables for multiple access to telecommunication services as described in 7) and including:
    - A Terminating systems at both distributor and outlet locations and at least one 50 pair copper cable, with accurate completion of installation records, drawing alterations and compliance forms
    - B Placing of cables on support structures and building faces for both internal and external locations
    - C Securing cables correctly for above locations
    - D Avoiding cable damage such as crushing, burning, kinking, sheath twist, cutting and nicking, bending radius
    - E Reading and interpreting drawings related to cable layouts, outlet location, cable coding system and identifiers, distributor locations
    - F Conducting and interpreting cable test results
    - G Correctly interpreting and applying standards and regulations

- H Completing the required documentation
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in laying and connecting cables for multiple access to telecommunication services.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE005A Fix and secure equipment
- UEENEEE007A Use drawings, diagrams, schedules and manuals

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.2; 1.4; 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.7	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.6	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.13; 3.2 to 3.6	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
1 Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.16; 4.3 to 4.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11; 3.13

## UEENEEF003A **Install and maintain cabling for telecommunication services in lifts**

### **Unit Descriptor**

1)

This unit covers the installation and termination of telecommunications cabling in buildings and premises. It encompasses working safely and to Australian Communications and Media Authority's 'Lift' Cabling Provider Rule, installing multiple telephone line, multi-pair cables, backbone cabling, terminating in socket outlets, termination modules and distributors, testing and compliance checks and completing cabling documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG016A Diagnose and rectify faults in lifts systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit applies to customer cabling terminated on distributors and to the installation, maintenance and modification of indoor, external, underground cabling. Customer cabling, for the purpose of this standard, may be used to connect devices for a range of applications, including for example: telecommunications (phones and facsimile), data including video and multimedia, security and alarms, and fire protection.

### **Licence to practise**

3.1)

This unit meets the minimum ACMA 'prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved'. Therefore, skills and knowledge described in this

unit may only be practised under the requirements set out in ACMA ‘Lifts’ Cabling Provider Rule.

Practice of this competency standard unit is also subject to regulations directly related to occupational health and safe and contracts of training where they apply.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Data and Voice Communications

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install or alter cabling in lifts

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Health and safety risks are identified and established risk control measures and procedures are followed in preparation for the work.
- 1.3 Remote power feeding is identified and established risk control measures prepared.
- 1.4 The nature and location of the work is determined from documentation or in discussion with appropriate person(s) to establish the scope of work to be undertaken.
- 1.5 Cable routes are planned within the constraints of the building structure,, significant and regulations.
- 1.6 Earthing requirements are determined with consideration of existing earthing arrangements, where applicable and of cable system earth upper and lower resistance limitations.
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.

- 1.8 Sources of materials that may be required for the work are established in accordance with established routines and procedures.
- 1.9 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
- 2 Install or alter cabling in lifts.
  - 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
  - 2.2 Installed support structure is checked to ensure cable will not be exposed to damage during installation and general operation.
  - 2.3 Catenary supports are secured to building structure and tensioned where necessary to ensure cable weight can be carried in operating conditions with interference and safety segregation maintained including adherence to AS/ACIF S009.
  - 2.4 Protective earthing of metal work is installed in accordance with requirements and to industry standards.
  - 2.5 Cables/wires are handled in accordance with manufacturer application specifications including tension and bending stress requirements.
  - 2.6 Control cubicles, travelling cable supports, junction boxes, line isolator units, back-mount and outlet layout conforms to manufacturer specifications and allows adequate work space for ease of access and avoid overlaying and segregation incoming and outgoing cables.
  - 2.7 Sufficient excess is allowed at cable ends to facilitate termination.
  - 2.8 Telecommunication outlet ends of cable are uniquely labelled to match identifier at originating location.
  - 2.9 Cable is placed and secured to maintain safety and interference segregation in accordance with legislative and industry standards.
  - 2.10 Cable ties not tightened to the point of causing cable sheath damage or transmission impairment are trimmed flush to prevent risk of personal damage.

- 2.11 Cables installed as catenaries or supported by catenaries in external environment shall meet minimum above ground clearances and clearances from hazardous electrical services as per AS/ACIF S009.
  - 2.12 Travelling cables installed and secured to maintain safety and in accordance to relevant legislative, industry and manufacturer’s standards.
  - 2.13 Local Isolation Units are fitted as required by TS001 and AS/ACIF S009.
  - 2.14 Over-voltage protection devices are fitted to all cable pairs, where required, to suppress voltage surges with the devices protectively earthed in accordance with AS/ACIF S009.
  - 2.15 TRC/CES/Earth wire insulation is protected against damage and TRC/CES and protective earths segregated in accordance with relevant industry and legislative standards AS/ACIF S009.
  - 2.16 Procedures for referring non-routine events to immediate supervisor for directions are followed.
  - 2.17 Cabling is installed efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or services.
  - 2.18 Routine quality checks are carried out to ensure cabling complies with requirements.
3. Terminate and test cables and earth wires in lifts.
- 3.1 Established OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Cable sheath removed to allow for correct termination length and without damage to underlying conductors and their insulation.
  - 3.3 Terminating modules are installed in accordance to manufacturer specifications and cable pairs neatly and sequentially fanned for termination.
  - 3.4 Conductors are terminated in accordance with recommended colour code sequence using appropriate termination tools in accordance with manufacturer specifications.
  - 3.5 Cable shield (if applicable) is earthed to manufacturer specifications and relevant industry codes of practice including AS/ACIF S009.

- 3.6 Visual inspection is undertaken to confirm termination colour code sequence has been followed prior to end-to-end testing of wire and pair termination integrity.
- 3.7 Cable pairs are tested and clearly labelled to provide an accurate identification in accordance with requirements.
- 3.8 TRC/CES/Earth wires are terminated with connectors recommended by manufacturers in accordance with relevant industry codes of practice including AS/ACIF S009.
- 3.9 TRC/CES /Earth wire continuity is maintained through out and interface requirements with electrical systems are observed.
- 3.10 TRC/CES /Earthing installation is tested for continuity, insulation resistance and conductive resistance as per relevant industry standards including AS/ACIF S009.
- 3.11 Earthing system is labelled in accordance with requirements.
- 3.12 Compatibility of alterations with existing systems is confirmed and new work tested both in isolation and when integrated with existing systems.
- 3.13 Procedures for referring non-routine events to immediate supervisor for directions are followed.
- 3.14 Cabling is terminated efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or services.
- 3.15 Routine quality checks are carried out and a defect rectified to ensure cabling complies with requirements.
- 4 Complete cabling work, records and reporting.
  - 4.1 OHS work completion risk control measures and procedures are followed.
  - 4.2 Work site is cleaned and made safe in accordance with established procedures.
  - 4.3 Record sheets and plans of cable location, type and infrastructure are accurately created or updated and stored in accordance with customer requirements..

- 4.4 Cable pair record books are created or updated to provide an accurate record of pair locations, inter-connections and usage in accordance with industry codes of practice and AS/ACIF S009.
- 4.5 Cabling completion advice is documented and reported in accordance with requirements.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintaining cabling for telecommunication services in lifts. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.1 Cable protection and support
- 2.4.1.4 Lift telecommunications cabling regulations and installation
- 2.5.11 Environmental and heritage awareness
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing and maintaining cabling for telecommunication services in lifts.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control

measures as specified in the Performance Criteria and Range Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and maintain cabling for telecommunication services in lifts as described in 7) and including:
    - A Terminating travelling cables at termination devices and outlet locations with accurate completion of installation records, drawing alterations and compliance forms
    - B Placing of cables on support structures and building faces for both internal and external locations
    - C Securing cables correctly for above locations
    - D Securing trailing cables
    - E Avoiding cable damage such as crushing, burning, kinking, sheath twist, cutting and nicking, bending radius
    - F Reading and interpreting drawings related to cable layouts, outlet location, cable coding system and identifiers, distributor locations
    - G Conducting and interpreting cable test results
    - H Correctly interpreting and applying standards and regulations
    - I Completing the required documentation
    - J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice

**assessment** using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and maintaining cabling for telecommunication services in lifts.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of Occupational Health and Safety covered in UEENEEE001A and other discipline specific Occupational Health and Safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.2; 1.4; 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.7	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  1.6	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  1.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.17; 3.2 to 3.6	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	2.16; 4.3 to 4.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.16; 3.13

## **UEENEEF004A      Install and modify performance data communication structured cabling**

### **Unit Descriptor**

**1)**

This unit covers the installation and termination of high performance data cabling in buildings and premises and intended for connection a telecommunications network. It encompasses working safely and to standards, installing multiple data lines and backbones using structured twisted pair cabling, terminating at distributors, termination modules and in socket outlets, testing and compliance checks and completing cabling documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEF002A      Lay and connect cabling for multiple access to telecommunication services

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a registration to practise in the workplace subject to requirements set out ACMA ‘Open’ Cabling Provider Rule. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Data and Voice Communications

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install and/or modify cabling.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Health and safety risks are identified and established risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Installation or modification of wiring is prepared in consultation with others affected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or in discussion with appropriate person(s) to establish the scope of work to be undertaken.
- 1.6 Cable routes are planned within the constraints of the building structure, fire walls, cultural/heritage requirements and regulations.
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
- 1.8 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
- 1.9 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |                           |  |   |
|---|---------------------------|--|---|
|   | 1.10                      | Preparatory work is checked to ensure no damage has occurred and that it complies with requirements. |   |
| 2 | Install cables or modify. | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |                           | 2.2  | Cables are installed or modification to comply with manufacturer specifications, technical standards and job requirements with sufficient excess to affect terminations.                      |
|   |                           | 2.3  | Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.   |
|   |                           | 2.4  | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |                           | 2.5  | Ongoing checks of the quality of installed or modified wiring are undertaken in accordance with established procedures.   |
|   |                           | 2.6  | Cable installation/modification is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices. |
| 3 | Terminate cables.         | 3.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |                           | 3.2  | Cable termination work area is cleaned and safety measure implemented.  |
|   |                           | 3.3  | Cables are prepared for termination in accordance with manufacturer specifications and technical standards.   |
|   |                           | 3.4  | Over voltage protection devices are fitted to cables with metallic components.  |
|   |                           | 3.5  | Cable shields are earthed in accordance with manufacturer specifications and technical standards.   |
|   |                           | 3.6  | Twist ratio of structured metallic cables is maintained in accordance with manufacturer specifications and technical standards.   |
|   |                           | 3.7  | Twisted pair cables are terminated in accordance with manufacturer specifications and technical standards.  |
|   |                           | 3.8  | Cable performance tests are conducted accurately and results documented.  |

- |   |   |   |
|---|---|---|
|   | 3.9   | Causes of defects indicated by test results are identified and rectified.   |
|   | 3.10  | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   | 3.11  | Ongoing checks of the quality of installed wiring are undertaken in accordance with established procedures.   |
|   | 3.12  | Cable terminations are carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices. |
| 4 | Document and verify cabling installation and performance. | 4.1 OHS work completion risk control measures and procedures are followed.  |
|   |   | 4.2 Work site is cleaned and made safe in accordance with established procedures.   |
|   |   | 4.3 Final checks are made to that the installed cabling conforms to requirements.   |
|   |   | 4.4 Documentation certifying system performance is issued to an appropriate person(s).  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and modifying performance data communication structured cabling. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.1.7.1 | Performance (copper) data cable installation and terminations |
| 2.11.8  | Data and voice cabling testing devices                        |
| 2.13.8  | Schedule maintenance processes                                |
| 2.18.1  | Occupational Health and Safety principles                     |
| 2.18.2  | Electrical Safe working practices                             |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing and modifying performance structured metallic cables each on at least two occasions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and modify performance data communication structured cabling as described in 7) and including:
    - A Reading and interpreting drawings related to cable layouts, cable schedules and apparatus locations.
    - B Routing, placing and securing cables to comply with requirements
    - C Maintaining fire integrity
    - D Preparing and terminating each type of cable to comply with requirements.
    - E Conducting cable performance test accurately
    - F Identifying and rectifying anomalies
    - G Completing the necessary documentation accurately.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:  
 Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:  
 Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and modifying performance data communication structured cabling.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:  
 Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEF009A    Install and connect voice and data communications equipment

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.7	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.11	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.10	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.10
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.10

## UEENEEF005A **Install and modify performance data communication optical fibre cabling**

### **Unit Descriptor**

1)

This unit covers the installation and termination of high performance data cabling in buildings and premises and intended for connection a telecommunications network. It encompasses working safely and to standards, installing multiple data lines and backbones using optical fibre cabling, terminating at distributors, splices and on socket outlets, testing and compliance checks and completing cabling documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEF002A Lay and connect cabling for multiple access to telecommunication services

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a registration to practise in the workplace subject to requirements set out ACMA 'Open' Cabling Provider Rule. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Data and Voice Communications

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install or modify performance data communication optical fibre cabling

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Health and safety risks are identified and established risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Installation or modification of wiring is prepared in consultation with others affected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or in discussion with appropriate person(s) to establish the scope of work to be undertaken.
- 1.6 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
- 1.7 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
- 1.8 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.9 Preparatory work is checked to ensure no damage has occurred and that it complies with requirements.

2 Install optical cables or modify.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 Optical fibres are tested for optical continuity.
- 2.2 Cables are installed or modification to comply with manufacturer specifications, technical standards and job requirements with sufficient excess to affect terminations.
- 2.4 Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.
- 2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.6 Ongoing checks of the quality of installed wiring are undertaken in accordance with established procedures.
- 2.7 Cable installation/modification is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
- 3 Terminate cables.
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Cable termination work area is cleaned and safety measure implemented, particularly for terminating optical fibre cables.
  - 3.3 Cables are prepared for termination in accordance with manufacturer specifications and technical standards.
  - 3.4 Optical fibre connectors are fitted in accordance with manufacturer specifications and technical standards.
  - 3.5 Appropriate methods are used to splice optical fibre cables in strict accordance with OHS safety measures, manufacturer specifications and technical standards.
  - 3.6 Cable performance tests are conducted accurately and results documented.
  - 3.7 Causes of defects indicated by test results are identified and rectified.
  - 3.8 Unexpected situations are dealt with safely and with the approval of an authorised person.

	3.9	Ongoing checks of the quality of installed wiring are undertaken in accordance with established procedures.
	3.10	Cable terminations are carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
4 Document install or modification, and verify data communication optical fibre cabling performance.	4.1	OHS work completion risk control measures and procedures are followed.
	4.2	Work site is cleaned and made safe in accordance with established procedures.
	4.3	Final checks are made to that the installed cabling conforms to requirements.
	4.4	Documentation certifying system performance is issued to an appropriate person(s).

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and modifying performance data communication optical fibre cabling. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.1.7.3	Optical fibre cabling installation and terminations
2.11.8	Data and voice cabling testing devices
2.13.8	Schedule maintenance processes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing or modifying two types of performance optical fibre cables each on at least two occasions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and modify performance data communication optical fibre cabling as described in 7) and including:
    - A Reading and interpreting drawings related to cable layouts, cable schedules and apparatus locations.
    - B Routing, placing and securing cables to comply with requirements
    - C Maintaining fire integrity
    - D Preparing and terminating each type of cable to comply with requirements.
    - E Conducting cable performance test accurately
    - F Identifying and rectifying anomalies
    - G Completing the necessary documentation accurately.

- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and modifying performance data communication optical fibre cabling

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEF009A Install and connect voice and data communications equipment

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.7	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.8	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.7	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.10
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.8

## UEENEEF006A Solve problems in data and voice communications circuits

### Unit Descriptor

1)

This unit covers providing known solutions to predictable problems in single and multiple path circuits operated at extra-low voltage as they apply to various data and voice communications work functions. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable communication circuit problems.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit shall apply to persons entering work in electrotechnology and may be used in school based vocational programs.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However they are subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

### Competency Field

4)

Data and Voice Communications

ELEMENT	PERFORMANCE CRITERIA
<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to work on extra-low voltage data and voice communications circuits</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 OHS risk control work preparation measures and procedures are followed.</p> <p>1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Sources of materials that may be required for the work are established in accordance with established procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
<p>2 Solve problems in extra-low voltage data and voice communications circuits</p>	<p>2.1 OHS risk control work measures and procedures are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.4 Established routines are used to solve circuit problems using measured and calculated values as they apply to single path, single source circuits.</p> <p>2.5 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.</p>

- |   |  |     |   |
|---|--|-----|---|
| 3 | Complete work and document problem solving activities. | 3.1 | OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.                                       |
|   |  | 3.3 | Justification for solutions used to solve circuit problems is documented.   |
|   |  | 3.4 | Work completion is documented and appropriate person(s) notified in accordance with established routine procedures. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in extra-low voltage data and voice communications circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.10.31 Electrotechnology communications principles

2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Single source single and multiple path communication circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:
  - Data Communications
  - Electronics
  - Fire protection
  - Renewable and sustainable energy systems, and
  - Security technology
- In relation to at least three of the following types of communication circuit problems and on at least two occasions:
  - Determining the operating parameters of an existing circuits
  - Determining the frequency response of an existing circuits
  - Identifying and locating open-circuits

- Identifying and locating short-circuits
- Identifying earth faults
- Identifying loss of supply

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in solving problems in extra-low voltage data and voice communications circuits as described in 7) and including:
    - A Determining the operating parameters of an existing circuit.
    - B Determining the frequency response of existing circuits
    - C Altering an existing circuit to comply with specified operating parameters.
    - D Developing circuits to comply with a specified function and operating parameters.
    - E Identifying earth faults.
    - F Identifying loss of supply.
    - G Dealing with unplanned events by drawing on

essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solve problems in extra-low voltage data and voice communications circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of Occupational Health and Safety covered in UEENEEE001A and other discipline specific Occupational Health and Safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.1	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEF007A Set up the wireless capabilities of communications and data storage devices

### Unit Descriptor

1)

This unit covers entering instructions in wireless devices with simple built-in programming function and verifying that the device operates as intended. It encompasses safe working practices, checking device software installation, following written and oral instruction and procedures and completing necessary documentation.

Note: Examples of wireless devices are personal digital assistants(PDAs), mobile phones, personal computers(PCs) remote controls etc

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit may require a registration to practise in the workplace subject to requirements set out ACMA ‘Open’ Cabling Provider Rule. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Data and Voice Communications

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to enter operating instructions.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are reported and advise on risk control measures are sought from the work supervisor.
- 1.4 Work supervisor or customers are consulted to determine which functions of the device are to be use and the parameter of each.
- 1.5 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
- 1.6 Device installation is checked for compliance with job specification and regulations where they apply.

2 Enter operating instructions.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.3 The required status of each function of the device is entered and their parameters set in accordance with manufactures programming instructions.
- 2.4 Entered data are checked as meeting those specified by the work supervisor or customer.

- |   |                                   |  |   |
|---|-----------------------------------|--|---|
|   | 2.5                               | Procedures for referring non-routine events to immediate supervisor for directions are followed. |   |
| 3 | Test device operation and report. | 3.1  | Device operation is tested in strict accordance OHS requirements and procedures.                        |
|   |                                   | 3.2  | Operating anomalies are identified and corrected in accordance with established routines.               |
|   |                                   | 3.3  | OHS work completion risk control measures and procedures are followed.                                  |
|   |                                   | 3.4  | Work site is cleaned and made safe in accordance with established procedures.                           |
|   |                                   | 3.5  | Work completion is reported and appropriate person(s) notified in accordance with established routines. |

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and set up the wireless capabilities of communications and data storage devices. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.10.30 Wireless devices

2.18.1 Occupational Health and Safety principles

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to entering and verifying operating instruction in at least two types of microprocessor equipped devices with built-in icon-based programmable functions such as programmable relays, timers, temperature controllers, detection devices for security and fire.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up the wireless capabilities of communications and data storage devices as described in 7) and including:
    - A Understanding required operating functions and parameters.
    - B Identifying non-compliance conditions of device installation.
    - C Entering functions and parameters correctly.
    - D Correcting programming anomalies.
    - E Testing and verify device operation.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up the wireless capabilities of communications and data storage devices.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 3.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.2	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.5; 3.2; 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEF008A **Select and arrange equipment for wireless networks**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers selecting and arranging of wireless access devices, routers and switches for local area and wide area networks intended for connection to a telecommunications network. The unit encompasses selecting compliant equipment, developing LAN/WAN arrangements that comply with regulation, based on calculated and deemed-to-comply solutions and completing network documentation.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEF007A    Set up the wireless capabilities of communications and data storage devices</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td>Reading</td> <td style="text-align: center;">3</td> <td>Writing</td> <td style="text-align: center;">3</td> <td>Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended as an additional competency to relevant competencies previously acquired and is therefore not applicable to those entering work.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Data and Voice Communications</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to select equipment.	1.1 The extent and nature of the communications network is determined from job specifications.
	1.2 Safety and other regulatory requirements to which the wireless network area shall comply are identified, obtained and understood.
2 Arrange locations of equipment and cable routes.	2.1 Location of equipment is arranged to comply with job specifications and regulatory requirements.
	2.2 Cable routes are planned to ensure maximum lengths specified by standards and the manufacturer are not exceeded.
	2.3 Cable routes are planned to comply with job specifications and regulatory requirements.
	2.4 Earthing is arranged to comply with job specifications and regulatory requirements.
3 Select cables and equipment.	3.1 Cables types are selected for suitability for the environments in which they are to be installed, performance required, and regulatory requirements.
	3.2 Cable sizes are selected to meet capacity and performance requirements.
	3.3 Earthing components are selected to meet regulatory and earthing requirements.
	3.4 Evidence is obtained that network equipment selected complies with safety requirements.
	3.5 Electronic equipment types are selected for suitability for the environments in which they are to be installed, performance required, and regulatory requirements.
4 Document communications network.	4.1 Reasons for selections made, including calculations, are documented in accordance with established procedures.
	4.2 Wireless networks equipment for arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and selecting and arranging equipment for wireless networks. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.2 Enterprise work activities records
- 2.4.1.2 Telephone system fundamentals
- 2.4.3.2 Networking fundamentals
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to selecting and arranging equipment for wireless networks comprising a representative range of network wireless components.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Select and arrange equipment for wireless networks as described in 7) and including:
  - A Arranging network to comply with safety and other regulatory and functional requirements
  - B Selecting appropriate types and sizes of cables
  - C Arranging network equipment
  - D Selecting appropriate earthing components
  - E Documenting installation arrangement, specification for items selected and reasons for the selections made
  - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in selecting and arranging equipment for wireless networks.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

**with other units****Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2
	Note: Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEEED001A Use basic computer applications'	

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.2

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A
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## UEENEEF009A **Install and connect voice and data communications equipment**

### **Unit Descriptor**

1)

This unit covers the installation, termination and setting up of voice and data equipment for high performance LANs in buildings and premises and intended for connection to a telecommunications network. It encompasses working safely and to standards, installing hubs, routers, switches, decoders, PABXs connected by structured, coaxial and optical fibre cabling, and completing network documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEF004A     Install and modify performance data communication structured cabling

UEENEEF005A     Install and modify performance data communication optical fibre cabling

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a registration to practise in the workplace subject to requirements set out ACMA 'Open' Cabling Provider Rule. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical communications equipment and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Data and Voice Communications

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install communications equipment and associated equipment.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Health and safety risks are identified and established risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Installation of communications equipment is prepared in consultation with others affected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or in discussion with appropriate person(s) to establish the scope of work to be undertaken.
- 1.6 A location of communications equipment and associated equipment is planned within the constraints of the building structure, significants and regulations.
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
- 1.8 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
- 1.9 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |  |  |   |
|---|--|--|---|
|   | 1.10   | Preparatory work is checked to ensure no damage has occurred and that it complies with requirements. |   |
| 2 | Install communications equipment and associated equipment. | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |  | 2.2  | Tests are carried out in strict accordance with OHS established safety procedures.  |
|   |  | 2.3  | Communications equipment is installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance.                                   |
|   |  | 2.4  | Cabling is terminated at communications equipment in accordance with manufacture's specifications and functional and regulatory requirements.   |
|   |  | 2.5  | Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.   |
|   |  | 2.6  | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |  | 2.7  | Ongoing checks of the quality of installed communications equipment are undertaken in accordance with established procedures.   |
|   |  | 2.8  | Communications equipment installation is carried out efficiently without waste of materials or damage to communications equipment, circuits, the surrounding environment or services and using sustainable energy principles. |
| 3 | Completion and report installation activities.             | 3.1  | OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2  | Work site is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3  | Final checks are made to ensure that the installed communications equipment conforms to requirements.   |
|   |  | 3.4  | 'As-installed' communications equipment is documented in accordance with requirements and appropriate person(s) notified in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and connecting voice and data communications equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.3.2 Network fundamentals
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing and connecting at least 5 different types of voice and data communications equipment terminating three types of communications cable.

Note:

1. Examples of communications equipment are distribution frames, hubs, routers, switches, decoders, PABXs and the like
2. Example of connecting cables are by structured cable, coaxial cables and optical fibre cabling.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most

effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and connect voice and data communications equipment as described in 7) and including:

- A Reading and interpreting drawings related to and communications equipment locations and connections.
- B Placing and securing communications equipment accurately
- C Maintaining fire integrity
- D Connecting communications equipment to comply with requirements
- E Completing the required documentation accurately
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and connecting voice and data communications equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

**with other units**

UEENEEF004A Install and modify performance data communication structured cabling

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEEF010A      Select and arrange equipment for local area networks**

### **Unit Descriptor**

**1)**

This unit covers selecting and arranging voice and data communication cabling routes, socket outlets, termination modules, switches, routers and distributors in LANs intended for connection to a telecommunications network. The unit encompasses selecting compliant equipment, developing LAN arrangements that comply with regulation, based on calculated and deemed-to-comply solutions and completing network documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEF004A      Install and modify performance data communication structured cabling

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended as an additional competency to relevant competencies previously acquired and is therefore not applicable to those entering work.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

**Competency Field****4)**

Data and Voice Communications

**ELEMENT****PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to select equipment.	<p>1.1 The extent and nature of the communications network is determined from job specifications.</p> <p>1.2 Safety and other regulatory requirements to which the communications network area shall comply are identified, obtained and understood.</p>
2 Arrange locations of equipment and cable routes.	<p>2.1 Location of equipment is arranged to comply with job specifications and regulatory requirements.</p> <p>2.2 Cable routes are planned to ensure maximum lengths specified by standards and the manufacturer are not exceeded.</p> <p>2.3 Cable routes are planned to comply with job specifications and regulatory requirements.</p> <p>2.4 Earthing is arranged to comply with job specifications and regulatory requirements.</p>
3 Select cables and equipment.	<p>3.1 Cables types are selected for suitability for the environments in which they are to be installed, required performance and regulatory requirements.</p> <p>3.2 Cable sizes are selected to meet capacity and performance requirements.</p> <p>3.3 Earthing components are selected to meet regulatory and earthing requirements.</p> <p>3.4 Evidence is obtained that network equipment selected complies with safety requirements.</p> <p>3.5 Electronic equipment types are selected for suitability for the environments in which they are to be installed, required performance and regulatory requirements.</p>
4 Document communications network.	4.1 Reasons for selections made, including calculations, are documented in accordance with established procedures.

- 4.2 Communications network arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and selecting and arranging equipment for local area networks. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.7.1 Performance (copper) data cable installation and terminations
- 2.1.7.2 Coaxial cable installation and terminations
- 2.1.7.3 Optical fibre cabling installation and terminations
- 2.2.2 Enterprise work activities records
- 2.4.1.2 Telephone system fundamentals
- 2.4.2.1 Telecommunication earthing and protection
- 2.4.3.2 Networking fundamentals
- 2.4.6 PABX fundamentals
- 2.4.8 Switches, hubs and routers
- 2.4.9 Decoders
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to selecting and arranging equipment for local area networks comprising a distribution frame, at least 20 telecommunication and 20 data outlets PABX and server.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## **Critical aspects of evidence required to**

### **8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Select and arrange equipment for local area networks as described in 7) and including:
    - A Arranging network to comply with safety and other regulatory and functional requirements.
    - B Selecting appropriate types and sizes of cables.
    - C Arranging network equipment.
    - D Selecting appropriate earthing components.
    - E Documenting installation arrangement, specification for items selected and reasons for the selections made.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in selecting and arranging equipment for local area networks.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEF001A Use basic computer applications relevant to a workplace

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEED001A Use basic computer applications'

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 4.1; 4.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: N/A

## UEENEEF011A Test, report and rectify faults in voice and data installations

### Unit Descriptor

1)

This unit covers testing for certification finding and repairing faults in telecommunication installations and local area networks. The unit encompasses working safely, reading cabling diagrams, performance testing, applying logical fault finding procedures, testing functionality of the network, conducting repairs and completing the necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEF004A Install and modify performance data communication structured cabling

UEENEEF005A Install and modify performance data communication optical fibre cabling

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training

### Licence to practise

3.1)

The skills and knowledge described in this unit require a registration to practise in the workplace subject to requirements set out ACMA 'Open' Cabling Provider Rule. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical communications equipment and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Data and Voice Communications

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to test, report and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Health and safety risks are identified, and established risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Testing is prepared in consultation with others affected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or in discussion with appropriate person(s) to establish the scope of work to be undertaken.
- 1.6 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
- 1.7 Material needed for the testing, reporting and rectifying work is obtained in accordance with established procedures and checked against job requirements.
- 1.8 Tools, equipment and testing devices needed to for the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.9 Preparatory work is checked to ensure no damage has occurred and that it complies with requirements.

- |   |   |     |  |
|---|---|-----|--|
| 2 | Test and rectify faults                       | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.   |
|   |   | 2.2 | Tests are carried out in strict accordance with OHS established safety procedures.   |
|   |   | 2.3 | Tests are prepared and conducted in accordance with test equipment operating instructions and requirements.  |
|   |   | 2.4 | Cable performance tests are conducted accurately and results documented in accordance with established procedures.   |
|   |   | 2.5 | Causes of defects or faults indicated by test results are identified and rectified in accordance with established procedures.  |
|   |   | 2.6 | Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.  |
|   |   | 2.7 | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   |   | 2.8 | Ongoing checks of the quality of installed equipment are undertaken in accordance with established procedures.   |
|   |   | 2.9 | Testing and rectifying faults is carried out efficiently without waste of materials or damage to equipment, circuits, the surrounding environment or services and using sustainable energy principles. |
| 3 | Document and verify installation performance. | 3.1 | OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
|   |   | 3.3 | Service reports are completed, when necessary in accordance with established procedures.   |
|   |   | 3.4 | Documentation certifying system performance is issued to an appropriate person(s).   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and testing, reporting and rectifying faults in voice and data installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.3.2	Networking fundamentals
2.11.5	Basic electrical testing and measuring devices and techniques
2.11.8	Data and voice cabling testing and testing devices
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to testing, reporting and rectifying faults in voice and data installations comprising two different items of customer premises equipment and a local area network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in

some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Test, report and rectify faults in voice and data installations as described in 7) and including:
    - A Reading and interpreting drawings and schedules of the installation
    - B Preparing and conducting appropriate test accurately
    - C Interpreting test results correctly
    - D Identifying defects/faults from test results
    - E Rectifying faults effectively
    - F Completing the required documentation accurately.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in testing, reporting and rectifying faults in voice and data installations

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEF004A Install and modify performance data communication structured cabling

UEENEEF009A Install and connect voice and data communications equipment

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5	1
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6; 2.7

## UEENEEF012A Install aerial communication cables

### Unit Descriptor

1)

This unit covers installation of catenary and aerial communication cables on existing post and poles.. The unit encompasses working safely and to standard and specifications, installing catenary cable, fixing communication cables and completing necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEF002A Lay and connect cabling for multiple access to telecommunication services

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a registration to practise in the workplace subject to requirements set out ACMA ‘Open’ Cabling Provider Rule. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical communications equipment and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to

currency in First Aid, confined space, lifting and risk safety measures.

## Competency Field 4)

### Data and Voice Communications

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to install aerial communication cables	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Health and safety risks are identified and established risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.</p> <p>1.4 Cabling installation is prepared in consultation with others affected by the work and sequenced appropriately.</p> <p>1.5 The nature and location of the work is determined from documentation or in discussion with appropriate person(s) to establish the scope of work to be undertaken.</p> <p>1.6 Cable routes are planned within the constraints of the precinct, structure, significants and regulations.</p> <p>1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.</p> <p>1.8 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.</p> <p>1.9 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.</p> <p>1.10 Preparatory work is checked to ensure no damage has occurred and that it complies with requirements.</p>
2 Install aerial communication cables.	2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 Poles are checked for soundness in accordance with established procedures.
  - 2.3 Catenary cables are installed ensuring sufficient clearances are maintained in compliance with requirements.
  - 2.4 Cables are attached to the catenary without strain or damage.
  - 2.5 Cable ends are protected from damage in preparation for termination.
  - 2.6 Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.
  - 2.7 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.8 Ongoing checks of the quality of installed aerial communication cables are undertaken in accordance with established procedures.
  - 2.9 Cable installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
- 3 Document and verify cabling installation
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Documenting cable installation.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing aerial communication cables. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.6.2 Telecommunication aerial cabling
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.14 Aerial safety practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing a representative range of aerial communication cables each, on at least two occasions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install aerial communication cables as described in 7) and including:
    - A Reading and interpreting drawings related to cable schedules and routes
    - B Installing catenary cables correctly
    - C Attaching communications cable to catenary without damage
    - D Protecting cable ends
    - E Completing the necessary documentation accurately
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing aerial communication cables.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no current assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.4	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.7	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.12	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.11	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.11

## UEENEEF013A Install below ground communication cables

### Unit Descriptor

1)

This unit covers installation of below ground conduits and ducts and drawing-in communication cables. The unit encompasses working safely and to standard and specifications, preparing and filling trenches, placing conduits and ducts, drawing cables, and completing necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEF002A Lay and connect cabling for multiple access to telecommunication services

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a registration to practise in the workplace subject to requirements set out ACMA 'Open' Cabling Provider Rule. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical communications equipment and site rehabilitation.  
 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Data and Voice Communications

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install below ground communication cables.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Health and safety risks are identified and established risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Cabling installation is prepared in consultation with others affected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or in discussion with appropriate person(s) to establish the scope of work to be undertaken.
- 1.6 Cable routes are planned within the constraints of the precinct, structure, significants and regulations.
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
- 1.8 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
- 1.9 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.10 Preparatory work is checked to ensure no damage has occurred and that it complies with requirements.

2 Install below ground communication cables.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- |   |  |  |
|---|--|--|
|   | 2.2  | Trenching is checked as complying with requirements and standards.   |
|   | 2.3  | Ducts/conduits are laid in compliance with requirements and standards.   |
|   | 2.4  | Cables are drawn-in without stain of damage.   |
|   | 2.5  | Cable ends are protected from damage in preparation for termination.   |
|   | 2.6  | Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.  |
|   | 2.7  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   | 2.8  | Ongoing checks of the quality of installed wiring are undertaken in accordance with established procedures.  |
|   | 2.9  | Cable installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices. |
| 3 | Document and verify installation of below ground communication cables. | 3.1 OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2 Work site is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3 Documenting cable installation.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing aerial communication cables. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.1.6.3 | Telecommunication below ground cabling    |
| 2.18.1  | Occupational Health and Safety principles |
| 2.18.2  | Electrical Safe working practices         |
| 2.18.15 | Trenching safety practices                |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing a representative range of below ground communication cables each on at least two occasions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training

Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install below ground communication cables as described in 7) and including:
    - A Reading and interpreting drawings related to cable schedules and routes
    - B Installing ducts/conduits below ground correctly
    - C Drawing in cables without strain or damage
    - D Protecting cable ends
    - E Completing the necessary documentation accurately
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing below ground communication cables.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no current assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  4.4	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.7	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.12	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.11	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.11

## UEENEEF014A Set up and configure basic data communications systems

### Unit Descriptor

1)

This unit covers setting up, configuring and maintaining operation of personal computer based data communications systems. It encompasses safe working practices, installing data communications hardware, installing and configuring data communications software and documenting set-up parameters.

Note:

This unit applies to all aspects of Electrotechnology - engineering applications only. For general competencies related Information Technologies refer to the latest endorsed IT Training Package.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENED002A Assemble, set up and test personal computers

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Computer Systems

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to set up and configure basic data communications systems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 The extent of set-up and configuration work is determined from job specifications and in consultation with appropriate person(s).</p> <p>1.3 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.4 Hardware and software needed for the work are obtained in accordance with established procedures and checked against job requirements.</p> <p>1.5 Preparatory work is checked to ensure no damage has occurred and that it complies with requirements.</p> <p>1.6 OHS processes and procedures for a given work area are identified, obtained and understood.</p>
2 Set up, configure and maintain basic data communications equipment.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Layout of data communications hardware, cabling and outlets is determined from job specifications or in consultation with appropriate person(s).</p> <p>2.3 Hardware is installed in accordance with the data communications system requirements. (Note 1)</p> <p>2.4 Data communications software is installed and configured in accordance with network requirements. (Note 2)</p> <p>2.5 Data communications operations are tested and anomalies identified and corrected.</p> <p>2.6 Reported data communications failures and faults are responded to and appropriate tools and methods are used.</p> <p>2.7 Identified causes of reported problems are rectified and the data communications link is tested in accordance with established procedures.</p>

	2.8	Unexpected situations are dealt with safely and with the approval of an authorised person.	
	2.9	Set-up configuration and maintenance are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.	
3	Complete work and document activities.	3.1	OHS risk control work completion measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Data communications configuration and maintenance records are maintained in accordance with established procedures.
		3.4	Service report is completed and forward to appropriate person(s) in accordance with established procedures.

Notes.

1. Examples of hardware include cables and connectors, dial up modems, and cable modems.
2. Examples of configuration include data communications protocols, user options and permissions, security, driver software.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and in setting up and configuring basic data communications systems.

The extent of the essential knowledge and skills required is given Volume 2 Part 2, Clauses:

- |         |   |
|---------|---|
| 2.4.3.1 | Data Communication Fundamentals           |
| 2.18.1  | Occupational Health and Safety Principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to setting up and configuring basic data communications systems that include:

- Standard serial and parallel ports
- High-speed ports (eg. USB, Firewire)
- 1 dial-up modem
- 1 broadband modem

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

---

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up and configure basic data communications systems as described in 7) Range: and including:
    - A Establishing the extent of work schedule.
    - B Obtaining specified hardware and software according to the work.
    - C Laying out network in accordance with requirements.
    - D Installing hardware as specified.
    - E Installing and configuring software to requirements.
    - F Identifying and correcting anomalies.
    - G Finding the cause of faults/malfunctions.
    - H Rectifying the cause of malfunctions.
    - I Documenting network configurations and activity results for future referencing.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in context of assessment’, which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up and configuring basic data communications systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6) Key Competencies:**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.2 to 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5; to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2; to 2.7	2

**Skills Enabling Employment**

**8.7) Skills Enabling Employment:**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:

		All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1,3; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.2 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.8

## UEENEEF015A Assemble and connect communication frames and cabinets

### Unit Descriptor

1)

This unit covers assembly and connection of communication frames and cabinets. The unit encompasses working safely, following standards, specifications and component/manufacturer requirements, matching equipment with that specified, terminating and connecting communication wiring and completing necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, schedules, and service manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in a workplace specifically for the purpose of assembling and connecting communication frames and cabinets. In other skills and knowledge described in this unit may only be practised under the requirements set out in ACMA 'Open' Cabling Provider Rule. In addition, practice in this unit is subject to regulations directly related to

occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Data and Voice Communications

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to assemble and connect communication frames and cabinets

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures for work preparation are followed.
- 1.3 Work instructions, including layout and wiring diagrams, are identified, obtained and understood.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Materials required for the work are obtained in accordance with established routines and procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Assemble and connect communication frames and cabinets

- 2.1 Established OHS risk control work measures are followed.
- 2.2 Equipment is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.3 Frames/cabinets and communication components are fitted in accordance with work instructions, standards and established routines.
- 2.4 Interconnections are made in accordance with work instructions, standards and established routines.
- 2.5 Routine quality checks are carried out in accordance with work instructions.

	2.6	Completed communication frames/cabinets are checked/testing against work instructions and industry standards and in strict accordance with OHS risk control measures.
	2.7	Procedures for referring non-routine events to immediate supervisor for directions are followed.
	2.8	Work is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3	Check quality of assembled communication frames and cabinets	3.1 Established OHS risk control measures for work completion are followed.
		3.2 Quality of assembled frames/cabinets is checked/tested against work instructions and industry standards and in accordance with established routines.
		3.3 Prescribed solutions are used where corrective actions to assembled components are necessary.
		3.4 Work report forms are completed accurately and appropriate person(s) notified in accordance with established routine.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and assembling and connecting communication frames and cabinets. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.1.6.4	Voice and data cabinet cabling terminations
2.4.2.2	Voice and data cabinet assembly and terminations
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to assembling and connecting communication frames and cabinets each on at least two occasions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

---

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble and connect communication frames and cabinets as described in 7) and including:
    - A Following assembly instructions
    - B Selecting and placing equipment correctly
    - C Making connection without damaging switchgear/control
    - D Adhering to quality procedures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling and connecting communication frames and cabinets.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following Performance Criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1G  
G – Electrical Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## UEENEEG001A Solve problems in electromagnetic circuits

### Unit Descriptor

1)

This unit covers determining correct operation of electromagnetic circuits and providing solutions as they apply to electrical installations and equipment. It encompasses working safely, power circuit problems solving processes, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in multiple path circuit.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEE004A Solve problems in multiple path d.c. circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
---------	---	---------	---	----------	---

### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to work on electromagnetic circuits.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve multiple path electrical circuit problems.

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Established methods are used to solving circuit problems from measure and calculated values as they apply to multiple path electrical circuit.
- 2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.

- |   |  |     |  |
|---|--|-----|--|
| 3 | Complete work and document problem solving activities. | 3.1 | OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3 | Justification for solutions used to solve circuit problems is documented.  |
|   |  | 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in electromagnetic circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.8.6  | Electromagnetic principles                |
| 2.11.1 | Hand tools                                |
| 2.18.1 | Occupational health and safety principles |
| 2.18.2 | Electrical safe working practice          |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

Single source parallel and series-parallel circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in the following discipline:

- Electrical

In relation to at least two of the following types of circuit problems and on at least two occasions:

- Determining the operating parameters of an existing circuit
- Alternating an existing circuit to comply with specified operating parameters
- Developing circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in electromagnetic circuits as described as described in 7) and including:
    - A Determining the operating parameters of an existing circuit.
    - B Alternating an existing circuit to comply with specified operating parameters.
    - C Developing circuits to comply with a specified function and operating parameters.
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in electromagnetic circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEG002A Solve problems in single and three phase low voltage circuits

### Unit Descriptor

1)

This unit covers ascertaining correct operation of single and three phase circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions. It encompasses safe working practices, multiphase circuit arrangements, issues related to protection, power factor and MEN systems and solutions to circuit problems derived from calculated and measured parameters.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEG001A Solve problems in electromagnetic circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to solve single and three phase low voltage circuit problems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
- 1.4 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve single and three phase low voltage circuit problems..

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Established methods are used to solve circuit problems from measure and calculated values as they apply to single and three-phase low voltage circuit.
- 2.5 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
- 2.6 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.7 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Complete work and document problem solving activities.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Justification for solutions used to solve circuit problems is documented.
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in electromagnetic circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.8.2.2 Alternating current principles - power
- 2.18.1 Occupational health and safety principles
- 2.18.2 Electrical safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any four of the following problems for both single and three-phase circuit.

- - Determining the operating parameters of existing circuits
  - Alternating an existing circuit to comply with specified operating parameters
  - Developing circuits to comply with a specified function and operating parameters

Note:

Operating parameters include voltage, current, impedance, power and power factor

- Determining the cause of low power factor in an existing circuit.
- Determining conditions causing an existing circuit to be unsafe.

Note:

Examples of unsafe circuits includes electric shock hazard from indirect contact with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Solve problems in electromagnetic circuits as described as described in 7) and including:
  - A Determining the operating parameters of existing circuits.
  - B Alternating an existing circuit to comply with specified operating parameters.
  - C Developing circuits to comply with a specified function and operating parameters.
  - D Determining the cause of low power factor in an existing circuit.
  - E Determining conditions causing an existing circuit to be unsafe.
  - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in electromagnetic circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:	

	2.4	1
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## UEENEEG003A Install wiring and accessories for low voltage circuits

### Unit Descriptor

1)

This unit covers the installation in building and premises of wiring enclosures, cable support systems, cables and accessories and intended to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to installation standards, routing cables to specified locations, terminating cables and connecting wiring at accessories and completing the necessary installation documentation.

Note: This unit includes the skills and knowledge covered by Unit UEENEEE008A Lay cables and terminate accessories.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, diagrams, schedules and manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install wiring.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Installation of wiring is prepared in consultation with other effected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or other appropriate person to establish the scope of work to be undertaken.
- 1.6 Cable routes are planned within the constraints of the building structure, significants and regulations.
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.

- 1.8 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
  - 1.9 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.
  - 1.10 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
- 2 Install wiring and accessories.
- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
  - 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Wiring and accessories are installed to comply with technical standards and job specifications and requirements with sufficient excess to affect terminations.
  - 2.5 Accessories are installed straight and square in the required locations and within acceptable tolerances.
  - 2.6 Cables and conductors are terminated at accessories in accordance with manufacture's specifications and regulatory requirements.
  - 2.7 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
  - 2.8 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.9 Ongoing checks of the quality of installed wiring are undertaken in accordance with established procedures.
  - 2.10 Cable installation and termination is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.

- |   |  |     |   |
|---|--|-----|---|
| 3 | Completion and report installation activities. | 3.1 | OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3 | Final checks are made to that the installed wiring conforms to requirements.  |
|   |  | 3.4 | ‘As-installed’ cables/wiring and accessories is documented and an appropriate person or persons notified in accordance with established procedures. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing wiring and accessories for low voltage circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.1.3   | Cables in buildings, structures and premises                                    |
| 2.1.5.1 | Power cable and conductor terminations  |
| 2.5.2.1 | Technical standards, regulations and codes for general electrical installations |
| 2.5.11  | Environmental and heritage awareness  |
| 2.7.1.2 | Electrical installations, wiring and accessories                                |
| 2.7.1.3 | Electrical wiring systems   |
| 2.7.2   | Electrical installation, equipment requirements                                 |
| 2.18.1  | Occupational Health and Safety principles                                       |
| 2.18.2  | Electrical Safe working practices   |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to at least three different wiring systems and circuits for four different purposes.

Note:

1. Examples of wiring systems include Thermoplastic insulated (TPI) cable in an enclosure such as conduit or trunking; Thermoplastic sheathed (TPS) circular or flat cable unenclosed; Thermoplastic sheathed (TPS) circular cable unenclosed; Steel wire armoured (SWA) cable unenclosed; Fire performance cables (eg MIMS, Radox, armoured, flexible, and the like); Flexible cables such as trailing cables;
2. Circuits types include circuits for Control devices; Fixed appliances/accessories; Lighting; Single phase motors and their controls; Socket outlets Three phase motors and their controls, synchronous machines and their controls, transformers and their controls, switchboards and/or distribution boards and their controls, protection and/or metering devices, d.c. machines and their controls other like equipment/accessories.
3. Cable support and mechanical protection devices are also included (eg clips, saddles, hangers, ties, non-metallic conduit, metallic conduit, cable ducts, trunking, cable trays/ladder) and other like devices.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety

and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install wiring and accessories for low voltage circuits as described as described in 7) and including:
    - A Reading and interpreting drawings related to cable layouts, cable schedules and apparatus locations.
    - B Routing, placing and securing cables to comply with requirements.
    - C Placing and securing accessories accurately.
    - D Maintaining fire integrity.
    - E Terminating cable and conductors to comply with

requirements.

- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing wiring and accessories for low voltage circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE008A Install wiring and terminate accessories for extra-low voltage circuits

UEENEEG004A Install low voltage electrical apparatus and associated equipment

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**
**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.7	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.7; 2.8	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.5	1

**Skills Enabling Employment**
**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills

enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.10
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 2.8

## UEENEEG004A Install low voltage electrical apparatus and associated equipment

### Unit Descriptor

1)

This unit covers the installation of protection devices, switchgear and controlgear, appliances and luminaries and intended to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to installation standards, matching equipment with that specified for a given location, placing and securing equipment accurately, making required circuit connections and completing the necessary installation documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, diagrams, schedules and manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install apparatus and associated equipment.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Installation of apparatus is prepared in consultation with other effected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or appropriate person to establish the scope of work to be undertaken.
- 1.6 Locations of apparatus and associated equipment are planned within the constraints of the building structure, significant and regulations.
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.

- |   |  |   |   |
|---|--|---|---|
|   | 1.8  | Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.   |   |
|   | 1.9  | Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety. |   |
|   | 1.10   | Preparatory work is checked to ensure no damage has occurred and complies with requirements.  |   |
| 2 | Install apparatus and associated equipment.    | 2.1   | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |  | 2.2   | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.  |
|   |  | 2.3   | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.   |
|   |  | 2.4   | Apparatus and associated equipment are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance.      |
|   |  | 2.5   | Wiring is terminated at apparatus and associated equipment in accordance with manufacture's specifications and functional and regulatory requirements.  |
|   |  | 2.6   | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.   |
|   |  | 2.7   | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |  | 2.8   | Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.  |
|   |  | 2.9   | Apparatus installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles. |
| 3 | Completion and report installation activities. | 3.1   | OHS work completion risk control measures and procedures are followed.  |

- 3.2 Work site is cleaned and made safe in accordance with established procedures.
- 3.3 Final checks are made to that the installed apparatus conforms to requirements.
- 3.4 ‘As-installed’ apparatus and associated equipment is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing low voltage electrical apparatus and associated equipment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.3 Cables in buildings, structures and premises
- 2.1.5.1 Power cable and conductor terminations
- 2.5.2.1 Technical standards, regulations and codes for electrical installations
- 2.5.11 Environmental and heritage awareness
- 2.6.6.2 Alternating current rotating machines
- 2.6.8.2 Single and three phase transformers
- 2.6.9.2 Luminaries and lighting systems
- 2.7.1.2 Electrical installations, wiring and accessories
- 2.7.1.3 Electrical wiring systems
- 2.7.2 Electrical installations, equipment requirements
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to at least four different electrical apparatus and associated equipment.

Note:

1. Examples of apparatus are switchboards/distribution boards and their controls; protective devices such as circuit breakers, fuses and residual current devices; control devices; fixed appliances/accessories; lighting and their controls; socket outlets; single phase motors and their controls; three phase motors and their controls; synchronous machines and their controls; transformers and their controls; metering devices; a.c./d.c. machines and their controls; motor starters and associated control devices other like equipment/accessories.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training

Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install low voltage electrical apparatus and associated equipment as described as described in 7) and including:
    - A Reading and interpreting drawings related to and apparatus locations and circuit connections.
    - B Placing and securing apparatus accurately.
    - C Maintaining fire integrity.
    - D Terminating and connecting apparatus and associated equipment to comply with requirements.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific**

**8.3)**

**resources for assessment**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing low voltage electrical apparatus and associated equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE007A Use drawings, diagrams, schedules and manuals

UEENEEG003A Install wiring and accessories for low voltage circuits

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 2.9

## **UEENEEG005A    Verify compliance and functionality of general electrical installations**

### **Unit Descriptor**

**1)**

This unit covers inspection and testing to verify whether an electrical installation is safe and complies with all requirements. It encompasses working safely, visual inspections and mandatory, optional and functional test procedures, identifying non-compliance defects and mandatory reporting requirements.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEE001A	Apply OHS practices in the workplace
UEENEEE002A	Dismantle, assemble and fabricate electrotechnology components
UEENEEE003A	Solve problems in extra-low voltage single path circuits
UEENEEE004A	Solve problems in multiple path d.c. circuits
UEENEEE005A	Fix and secure equipment
UEENEEE007A	Use drawings, diagrams, schedules and manuals
UEENEEE008A	Lay wiring and terminate accessories for extra-low voltage circuits
UEENEEE033A	Document occupational hazards and risks in electrical work
UEENEEG001A	Solve problems in electromagnetic circuits
UEENEEG002A	Solve problems in single and three phase low voltage circuits
UEENEEG003A	Install wiring and accessories for low voltage circuits
UEENEEG004A	Install low voltage electrical apparatus and associated equipment

- UEENEEG007A Select and arrange equipment for general electrical installations
- UEENEEG008A Find and repair faults in electrical apparatus and circuits
- UEENEEG009A Develop and connect control circuits

Elective units to a Unit Strand Total of at least 6 from Schedule 3.

**Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 4 Writing 4 Numeracy 4

**Application of the Unit**

**3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field**

**4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to inspect and test an electrical installation.	<p>1.1 OHS measures for the site are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.</p> <p>1.4 Documentation or deemed to comply standard on which installation is based is reviewed and understood.</p> <p>1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.6 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety.</p> <p>1.7 Preparatory work is checked to ensure no damage has occurred and complies with requirements.</p>
2 Visually inspect and conduct safety testing on the installation.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.4 Wiring is checked for suitability for the environments in which they are installed and suitably protected from damage or overheating.</p> <p>2.5 Cable conductor sizes are acquired as meeting current-carrying capacity requirements and voltage-drop and fault-loop impedance limitations.</p> <p>2.6 Protection methods and devices are validated as meeting co-ordination requirements for overload and short-circuit protection.</p>

- 2.7 Switchgear and control gear is validated as being appropriately rated and meeting functional requirements.
- 2.8 Evidence that electrical equipment complies with safety requirements is cited.
- 2.9 Earthing system components are checked that they are correctly located and conductors correctly sized.
- 2.10 Marking on switchboards are checked for accuracy and clarity and comply with requirements.
- 2.11 Mandatory tests are conducted to verify that:
- 2.12 Testing is conducted to verify that:
- 3 Report inspection and test findings.
  - 3.1 OHS risk control work completion measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Non-compliance defects are identified and reported in accordance with established procedures.
  - 3.4 Recommendations for rectifying defects are made in accordance with established procedures.
  - 3.5 Mandatory documentation is completed in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying compliance and functionality of general electrical installations.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.7.5.1 Electrical installations, testing and verification methods
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to verifying compliance and functionality of at least two electrical installations comprising of a main switchboard, at least supplying lighting, one circuit supplying socket outlets, one circuit supplying a fixed appliance. One of the installations shall include a distribution board additional to the main switchboard and a circuit supplying a three-phase load.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will

contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Verify compliance and functionality of general electrical installations as described as described in 7) and including:
    - A Selecting correct tools and testing equipment.
    - B Identifying visual non-compliance defects.
    - C Using effective methods for conducting mandatory and optional tests.
    - D Identifying non-compliance from test results.
    - E Identifying causes of non-compliance.

- F Completing mandatory reporting.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in verifying compliance and functionality of general electrical installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.10; 3.4; 3.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5; 2.6; 3.4; 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 4.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.4; 3.5	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3 to 4.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEG007A **Select and arrange equipment for general electrical installations**

### **Unit Descriptor**

1)

This unit covers selecting equipment for electrical installations operating at voltages up to 1,000V a.c. or 1,500 V d.c. to meet performance standards. These encompass schemes for protection of persons and property, correct function, compatibility with the supply, arrangement of circuits and selection of switchgear, controlgear, protection devices and wiring based on calculated and deemed-to-comply solutions.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEG002A      Solve problems in single and three phase low voltage circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired and is therefore not applicable to those entering work.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

- |   |   |     |  |
|---|---|-----|--|
| 1 | Prepare to select equipment.              | 1.1 | The extent and nature of the electrical installation is determined from job specifications.  |
|   |   | 1.2 | Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood. |
| 2 | Arrange installation into circuits.       | 2.1 | Circuits are arranged to ensure safe and functional operation of the installation.   |
|   |   | 2.2 | Circuits are arranged to comply with technical standards and job specifications and requirements.  |
|   |   | 2.3 | Earthing is arranged to comply with the MEN system requirements.   |
| 3 | Select cables, protection and switchgear. | 3.1 | Wiring is selected for suitability for the environments in which they are installed.   |
|   |   | 3.2 | Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and fault-loop impedance limitations. |
|   |   | 3.3 | Protection methods and devices are selected to meet co-ordination requirements for overload and short-circuit protection.                |
|   |   | 3.4 | Switchgear and control gear is selected to meet current, voltage and IP ratings and functional requirements.                             |
|   |   | 3.5 | Earthing system components are selected to meet requirements of the MEN system.  |
|   |   | 3.6 | Evidence is obtained that electrical equipment selected complies with safety requirements.   |
| 4 | Document electrical installation.         | 4.1 | Reasons for selections made, including calculations, are documented in accordance with established procedures.                           |

- 4.2 Electrical installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and selecting and arranging equipment for general electrical installations.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.1 Cable protection and support
- 2.1.2 Cable types and applications
- 2.1.3 Cables in buildings, structures and premises
- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.3.1 Electrical control devices
- 2.5.1.2 Drawings and diagrams
- 2.5.2.1 Technical standards, regulations and codes for electrical installations
- 2.5.2.2 Technical standards, regulations and codes for special electrical installations
- 2.5.10 Technical manuals and catalogues
- 2.5.11 Environmental and heritage awareness
- 2.6.1 Protection devices and applications
- 2.6.2.1 Switchboards/distribution boards
- 2.7.1.2 Electrical installations, wiring and accessories
- 2.7.1.3 Electrical wiring systems
- 2.7.2 Electrical installations, equipment requirements
- 2.7.3 Electrical installations, safety principles and requirements
- 2.7.4.1 Electrical installations, protection methods and devices

- 2.7.4.2 Electrical installations, circuit arrangements and equipment selection
- 2.11.3.1 Fixing and support devices and techniques
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to selecting and arrange equipment for general electrical installations comprising a main switchboard, at least supplying lighting, one circuit supplying socket outlets, one circuit supplying a fixed appliance. One of the installations shall include a distribution board additional to the main switchboard and a circuit supplying a three-phase load.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Select and arrange equipment for general electrical installations as described as described in 7) and including:
    - A Arranging electrical installations to comply with safety and other regulatory and functional requirements.

- B Selecting appropriate type and size of cables.
- C Selecting protection methods and devices that meet co-ordination requirements for overload and short-circuit protection.
- D Selecting switchgear and control gear that meet current, voltage and IP ratings and functional requirements.
- E Selecting appropriate earthing components.
- F Documenting installation arrangement, specification for items selected and reasons for the selections made.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in selecting and arranging equipment for general electrical installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEED001A Use basic computer applications relevant to a workplace

The critical aspects of occupational health and safety covered in UEENEEEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: (See Note)	2

Note:  
Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEEED001A Use basic computer applications'

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

# UEENEEG008A Find and repair faults in electrical apparatus and circuits

## Unit Descriptor

1)

This unit covers finding and repairing faults in electrical apparatus and interconnecting circuits and equipment operating at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely, reading circuit diagrams, sketching diagrams from traced wiring, logically applying fault finding procedures, conducting repairs and completing the necessary service documentation.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEG002A Solve problems in single and three phase low voltage circuits

UEENEEG003A Install wiring and accessories for low voltage circuits

UEENEEG004A Install low voltage electrical apparatus and associated equipment

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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## Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

## Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to

occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to find and rectify faults.

- 1.1 The extent and nature of the electrical installation is determined from job specifications.
- 1.2 Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.
- 1.3 OHS procedures for a given work area are identified, obtained and understood.
- 1.4 OHS risk control measures and procedures in preparation for the work are followed.
- 1.5 The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).
- 1.6 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.

2 Find and repair faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.

- |  |  |  |   |     |   |     |   |     |  |     |  |
|--|--|--|---|-----|---|-----|---|-----|--|-----|--|
| 2.5  | Fault finding is approached methodically drawing on knowledge of a.c. circuits and apparatus using measured and calculated values of circuit/apparatus parameters.   |  |   |     |   |     |   |     |  |     |  |
| 2.6  | Circuit/apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.   |  |   |     |   |     |   |     |  |     |  |
| 2.7  | Faulty circuits/components are rechecked and their fault status and acquired.  |  |   |     |   |     |   |     |  |     |  |
| 2.8  | Materials/replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.   |  |   |     |   |     |   |     |  |     |  |
| 2.9  | Effectiveness of the repair is tested in accordance with established procedures.   |  |   |     |   |     |   |     |  |     |  |
| 2.10   | Apparatus is reassembled, finally tested and prepared for return to service.   |  |   |     |   |     |   |     |  |     |  |
| 2.11   | Unexpected situations are dealt with safely and with the approval of an authorised person.   |  |   |     |   |     |   |     |  |     |  |
| 2.12   | Fault finding and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.   |  |   |     |   |     |   |     |  |     |  |
| 3  | <table border="0"> <tr> <td style="vertical-align: top; padding-right: 20px;">Completion and report fault finding and repair activities.</td> <td style="vertical-align: top;"> <table border="0"> <tr> <td style="vertical-align: top; padding-right: 20px;">3.1</td> <td style="vertical-align: top;">OHS work completion risk control measures and procedures are followed.</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;">3.2</td> <td style="vertical-align: top;">Work area is cleaned and made safe in accordance with established procedures.</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;">3.3</td> <td style="vertical-align: top;">Written justification is made for repairs to apparatus.</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;">3.4</td> <td style="vertical-align: top;">Work completion is documented and an appropriate person or persons notified in accordance with established procedures.</td> </tr> </table> </td> </tr> </table> | Completion and report fault finding and repair activities. | <table border="0"> <tr> <td style="vertical-align: top; padding-right: 20px;">3.1</td> <td style="vertical-align: top;">OHS work completion risk control measures and procedures are followed.</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;">3.2</td> <td style="vertical-align: top;">Work area is cleaned and made safe in accordance with established procedures.</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;">3.3</td> <td style="vertical-align: top;">Written justification is made for repairs to apparatus.</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;">3.4</td> <td style="vertical-align: top;">Work completion is documented and an appropriate person or persons notified in accordance with established procedures.</td> </tr> </table> | 3.1 | OHS work completion risk control measures and procedures are followed.        | 3.2 | Work area is cleaned and made safe in accordance with established procedures. | 3.3 | Written justification is made for repairs to apparatus.  | 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures. |
| Completion and report fault finding and repair activities. | <table border="0"> <tr> <td style="vertical-align: top; padding-right: 20px;">3.1</td> <td style="vertical-align: top;">OHS work completion risk control measures and procedures are followed.</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;">3.2</td> <td style="vertical-align: top;">Work area is cleaned and made safe in accordance with established procedures.</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;">3.3</td> <td style="vertical-align: top;">Written justification is made for repairs to apparatus.</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;">3.4</td> <td style="vertical-align: top;">Work completion is documented and an appropriate person or persons notified in accordance with established procedures.</td> </tr> </table>  | 3.1  | OHS work completion risk control measures and procedures are followed.  | 3.2 | Work area is cleaned and made safe in accordance with established procedures. | 3.3 | Written justification is made for repairs to apparatus.                       | 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures. |     |  |
| 3.1  | OHS work completion risk control measures and procedures are followed.   |  |   |     |   |     |   |     |  |     |  |
| 3.2  | Work area is cleaned and made safe in accordance with established procedures.  |  |   |     |   |     |   |     |  |     |  |
| 3.3  | Written justification is made for repairs to apparatus.  |  |   |     |   |     |   |     |  |     |  |
| 3.4  | Work completion is documented and an appropriate person or persons notified in accordance with established procedures.   |  |   |     |   |     |   |     |  |     |  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in electrical apparatus and circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |       |                                  |
|-------|----------------------------------|
| 2.2.1 | Enterprise communication methods |
|-------|----------------------------------|

- 2.2.2 Enterprise work activities records
- 2.2.3 Fault finding techniques
- 2.3.1 Electrical control devices
- 2.3.2 Control circuit fundamentals
- 2.5.2.1 Technical standards regulations and codes for general electrical installations
- 2.5.10 Technical manuals and catalogues
- 2.6.6.2 Alternating current rotating machines
- 2.6.8.2 Single and three phase transformers
- 2.6.9.1 Lighting fundamentals
- 2.6.9.2 Luminaries and lighting systems
- 2.6.10 Electrical heating
- 2.7.1.2 Electrical installation wiring and accessories
- 2.7.4.1 Electrical installation protection methods and devices
- 2.7.4.2 Electrical installations, arrangement and equipment selection
- 2.8.6 Electromagnetic principles
- 2.9.77 Electronic components and systems, industrial applications
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing faults and their cause in electrical apparatus and circuits. Finding and repairing fault types in electrical apparatus and interconnecting circuits and equipment operating at voltages up to 1000 V a.c. or 1500 V d.c include the following:

- Open-circuit
- Short-circuit
- Incorrect connections
- Insulation failure
- Unsafe condition
- Apparatus/component failure
- Related mechanical failure
- Other electrical apparatus and circuit faults
- Any five of the above shall apply.

Note:

1. Examples of apparatus are Control devices; Fixed appliances/accessories; Lighting; Single phase motors and their controls; Socket outlets Three phase motors and their controls, synchronous machines and their controls, transformers and their controls, switchboards and/or distribution boards and their controls, protection and/or metering devices, a..c./d.c. machines and their controls other like equipment/accessories.
2. Examples of circuits include those supplying fixed appliances; lighting; single-phase motors; socket outlets; three phase motors and controls circuits; machines and transformers; electronic or computer based equipment other like equipment/accessories.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be

required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in electrical apparatus and circuits as described as described in 7) and including:
    - A Envisaging the likely extent of the fault and the work from fault/breakdown reports and/or discussion to

elicit information on the fault/breakdown with appropriate person(s).

- B Using appropriate tools and resources, and methodical fault finding techniques.
- C Locating and finding faults efficiently.
- D Conducting tests or measurements in strict accordance with OHS and electrical safe working requirements.
- E Rectifying faults effectively.
- F Reporting and completing documentation correctly.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in electrical apparatus and circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG004A Install low voltage electrical apparatus and associated equipment

UEENEEG009A Develop and connect control circuits

The critical aspects of occupational health and safety covered in UEENEEG001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.4 to 2.8

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEG009A Develop and connect control circuits

### Unit Descriptor

1)

This unit covers developing, connecting and functionally testing electrical power and control circuits that perform specific control functions. It encompasses working safely; developing schematic/ladder diagrams and converting them to wiring diagrams; selecting and connecting contactors and control devices to perform a specific function.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEG002A	Solve problems in single and three phase low voltage circuits
UEENEEG003A	Install wiring and accessories for low voltage circuits
UEENEEG004A	Install low voltage electrical apparatus and associated equipment

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Develop and prepare to connect control circuits.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
- 1.4 Control scenarios are determined from discussions with appropriate person(s) and documented in accordance with established procedures.
- 1.5 Agreement for the control scenarios is sought from appropriate person(s) and documented in accordance with established procedures.
- 1.6 Schematic arrangement of control circuits that complies with agreed scenarios is documented in accordance with established procedures.
- 1.7 Materials needed to connect control circuits are obtained in accordance with established procedures and checked against job requirements.
- 1.8 Tools, equipment and testing devices needed to connect control circuits are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.9 Preparatory work is checked to ensure no damage has occurred and complies with requirements.

- |   |   |     |   |
|---|---|-----|---|
| 2 | Connect and test control circuits.                      | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |   | 2.2 | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.  |
|   |   | 2.3 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.   |
|   |   | 2.4 | Control circuit components are connected to comply with the agreed control scenario.  |
|   |   | 2.5 | Control circuit operation is tested for agreed functionality and in strict accordance with OHS requirements and established safety procedures.  |
|   |   | 2.6 | Non-compliant control functions are rectified to comply with the agreed control scenario.   |
|   |   | 2.7 | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |   | 2.8 | Control circuits are connected and tested efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practice. |
| 3 | Completion and document circuit development activities. | 3.1 | OHS work completion risk control measures and procedures are followed.  |
|   |   | 3.2 | Work site is cleaned and made safe in accordance with established procedures.   |
|   |   | 3.3 | ‘As-connected’ control circuits are documented using standard drawing conventions and an appropriate person or persons notified in accordance with established procedures.                                    |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and developing and connecting control circuits.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.1 Enterprise communication methods
- 2.2.2 Enterprise work activities records
- 2.2.3 Fault finding techniques
- 2.3.1 Electrical control devices
- 2.3.2 Control circuit fundamentals
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing and connecting at least four of the following control circuits:

- Multiple light switching circuit
- Master control circuit
- Single stop-start circuit
- Multiple stop-start circuit
- Time controlled circuit
- Machine interlocked circuit
- Motor jogging circuit
- Machine safety circuit

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop and connect control circuits as described as described in 7) and including:
    - A Determining control scenarios.
    - B Developing schematic arrangement of control circuits.
    - C Connecting control circuit function correctly.
    - D Identifying and correct non-compliant control functions.
    - E Documenting 'as-connected' control circuit.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in electrical apparatus and circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEG004A Install low voltage electrical apparatus and associated equipment
- UEENEEG008A Find and repair faults in electrical apparatus and circuits

The critical aspects of occupational health and safety covered in UEENEEG001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3 to 1.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 2.5; 2.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEG010A Find and repair faults in d.c. electrical apparatus and circuits

### Unit Descriptor

1)

This unit covers finding and repairing faults in electrical apparatus and interconnecting circuits and equipment operating at voltages up to 1,500 V d.c. It encompasses working safely, reading circuit diagrams, sketching diagrams from traced wiring, applying logical fault finding procedures, conducting repairs and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG008A Find and repair faults in electrical apparatus and circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electric

**ELEMENT**

**PERFORMANCE CRITERIA**

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>	
<p><b>1</b> Prepare to find and rectify faults.</p>	<p>1.1</p>	<p>OHS procedures for a given work area are identified, obtained and understood.</p>
	<p>1.2</p>	<p>OHS risk control measures and procedures in preparation for the work are followed.</p>
	<p>1.3</p>	<p>The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).</p>
	<p>1.4</p>	<p>Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p>
	<p>1.5</p>	<p>Sources of materials that may be required for the work are established in accordance with established procedures.</p>
	<p>1.6</p>	<p>Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.</p>
<p><b>2</b> Find and repair faults.</p>	<p>2.1</p>	<p>OHS risk control measures and procedures for carrying out the work are followed.</p>
	<p>2.2</p>	<p>The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p>
	<p>2.3</p>	<p>Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p>
	<p>2.4</p>	<p>Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.</p>

- 2.5 Fault finding is approached methodically drawing on knowledge of d.c. circuit and apparatus using measured and calculated values of circuit/apparatus parameters.
  - 2.6 Circuit/apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.7 Faulty circuits/components are rechecked and their fault status and acquired.
  - 2.8 Materials/replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.
  - 2.9 Effectiveness of the repair is tested in accordance with established procedures.
  - 2.10 Apparatus is reassembled, finally tested and prepared for return to service.
  - 2.11 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.12 Fault finding and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault finding and repair activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.
  - 3.3 Maintenance work activities are documented in accordance with established procedures.
- Note.  
Examples of documentation are component faults reports, test results, authorisations, permits, parts/component dispatch and stores records.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in d.c. electrical apparatus and circuits. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.12 Direct current machines

- 2.6.16 Direct current motor controls
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing faults and their cause in d.c. electrical apparatus and circuits. Finding and repairing fault types in electrical apparatus and interconnecting circuits and equipment operating at voltages up to d.c include the following:

- Open-circuit
- Short-circuit
- Incorrect connections
- Insulation failure
- Unsafe condition
- Apparatus/component failure
- Related mechanical failure
- Other electrical apparatus and circuit faults
- Any five of the above shall apply.

Note:

1. Examples of apparatus are d.c switchboards/distribution boards, protective devices such as circuit breakers and fuses, and d.c machines and associated control devices.
2. Examples of circuits include those related to d.c. apparatus; d.c machines and controls circuits.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the Industry’s preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile

- graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
  - Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Find and repair faults in d.c. electrical apparatus and circuits as detailed as described in 7) and including:
      - A Envisaging the likely extent of work from fault/breakdown reports and discussion with appropriate person(s).
      - B Using methodical fault finding techniques.
      - C Finding faults efficiently.
      - D Rectifying faults effectively.
      - E Completing documentation correctly.
      - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in d.c. electrical apparatus and circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and

incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG004A Install low voltage electrical apparatus and associated equipment

UEENEEG009A Develop and connect control circuits

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEG011A Carry out basic repairs to electrical apparatus

### Unit Descriptor

1)

This unit deals with the repair or replacement of mechanical and electrical components of electrical apparatus. It encompasses safe working practices, following written and oral instruction and procedures, basic testing and techniques for dismantling and assembling apparatus and disconnecting and reconnecting components

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit may apply to persons entering work in electrotechnology and may be used in school based vocational programs.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.  
 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to repair electrical apparatus.

- 1.1 OHS procedures for a given work area are obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The nature of the repair is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established routines and procedures.
- 1.6 Tools, apparatus and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Repair electrical apparatus.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Apparatus is dismantled in accordance with manufacturer’s guide and supervisor’s instructions.
- 2.5 Component parts are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage.

- 2.6 Repairs are affected efficiently without damage to other components, apparatus or circuits.
  - 2.7 Apparatus is assembled in an appropriate sequence with all components parts placed, secured and connected in accordance with manufacturer’s guide or industry practice.
  - 2.8 Procedures for referring non-routine events to immediate supervisor for directions are followed.
  - 2.9 Repairs are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report repair work activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Repaired apparatus is prepared and forwarded to appropriate person(s) for testing.
  - 3.3 Work area is cleaned and made safe in accordance with established procedures.
  - 3.4 Work supervisor is notified of the completion of the repair work in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out basic repairs to electrical apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.4 Basic cable and conductor terminations
- 2.11.2.2 Electrical workshop machines
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out basic repairs electrical apparatus limited to replacement or repair of components in which the fault has been previously established. This shall include at least two different electrical apparatus in which three different types of components are faulty one of which requires disconnecting and reconnecting internal wiring to affect repairs.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will

contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out basic repairs to electrical apparatus as described as described in 7) and including:
    - A Following manufactures service instructions for access to components.
    - B Removing at least three different types of components specified in the work instructions.
    - C Replacing components to manufacturer’s requirements.
    - D Terminating internal wiring correctly.

- E Reassembling the apparatus correctly.
- F Testing apparatus operation.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in 'Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out basic repairs to electrical apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.2	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.8

# UEENEEG012A Solve fundamental problems in electrical systems

## Unit Descriptor

1)

This unit covers ascertaining correct operation of electrical systems in building and premises and solving fundamental system problems as applies to engineering support work functions. It encompasses working safely, problem solving techniques, interpreting electrical measurements, providing solutions derived from measurements to predictable problems in electrical systems and providing justification for such solutions.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE025A      Solve problems in complex multiple path circuits

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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## Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 6.

## Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and

typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to solve single and three phase low voltage circuit problems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
- 1.4 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
- 1.6 Sources of materials that may be required for the work are established in accordance with established procedures
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2	Solve single and three phase low voltage circuit problems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
		2.3	Established methods are used to solve electrical system problems from measure and calculated values.
		2.4	Appropriately competent and authorised person(s) are directed to take particular electrical measurements where necessary.
		2.5	Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
		2.6	Unexpected situations are dealt with safely and with the approval of an authorised person.
3	Complete work and document problem solving activities.	3.1	OHS risk control work completion measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Justification for solutions used to solve electrical system problems is documented.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving fundamental problems in electrical systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.6	Electromagnetic principles
2.8.8	Electrotechnology science and materials
2.8.2.2	Alternating current principles - power
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any three of the following problems.

- Determining the operating parameters of an existing electrical system
- Alternating an existing electrical system to comply with specified operating parameters and regulatory requirements

Note:

Operating parameters include voltage, current, impedance, power and power factor

- Determining the cause of low power factor in an existing circuit.
- Determining conditions causing an existing circuit to be unsafe.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries

risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve fundamental problems in electrical systems as described as described in 7) and including:
    - A Determining the operating parameters of existing electrical systems.
    - B Using established problem solving methods.

- C Directing personnel to take relevant measurements.
- D Interpreting measured values appropriately.
- E Providing effective solutions to electrical system problems.
- F Giving written justification of solutions provided.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving fundamental problems in electrical systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE0025A Solve problems in complex multiple path circuits

The critical aspects of occupational health and safety covered in Unit UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3; 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## UEENEEG013A Install and maintain emergency systems

### Unit Descriptor

1)

This unit covers the installation and maintenance of fire and smoke control, emergency lighting and early warning systems in buildings and premises. It encompasses working safely and to installation and maintenance standards, complying with maintenance schedules and completing the necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG003A      Install wiring and accessories for low voltage circuits

UEENEEG004A      Install low voltage electrical apparatus and associated equipment

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting

equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

**5)** Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install and maintain emergency systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Installation/maintenance is prepared in consultation with other effected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or appropriate person to establish the scope of work to be undertaken.
- 1.6 Location of apparatus and associated equipment is planned within the constraints of the building structure, significants and regulations.
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
- 1.8 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
- 1.9 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.10 Preparatory work is checked to ensure no damage has occurred and complies with requirements.

- |   |  |     |   |
|---|--|-----|---|
| 2 | Install and maintain emergency systems                         | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |  | 2.2 | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.  |
|   |  | 2.3 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.   |
|   |  | 2.4 | Apparatus and associated equipment are installed and maintained to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance. |
|   |  | 2.5 | Wiring is terminated at apparatus and associated equipment in accordance with manufacture’s specifications and functional and regulatory requirements.  |
|   |  | 2.6 | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.   |
|   |  | 2.7 | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |  | 2.8 | Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.  |
|   |  | 2.9 | Apparatus installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.           |
| 3 | Completion and report installation and maintenance activities. | 3.1 | OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3 | Final checks are made to that the installed and maintained apparatus conforms to requirements.  |
|   |  | 3.4 | ‘As-installed’ emergency systems apparatus and associated equipment is documented and an appropriate person or persons notified in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintaining emergency systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.17	Cells and batteries
2.7.6	Electrical installations, emergency systems
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to fire and smoke control and evacuation lighting and warning systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Install and maintain emergency systems as detailed as described in 7) and including:
  - A Determining the operating parameters of existing electrical systems.
  - B Using established problem solving methods.
  - C Directing personnel to take relevant measurements.
  - D Interpreting measured values appropriately.
  - E Providing effective solutions to electrical system problems.
  - F Giving written justification of solutions provided.
  - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and maintaining emergency systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE0025A Solve problems in complex multiple path circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.2 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6
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## UEENEEG014A Develop plans and compliance policies to conduct a contracting business

### Unit Descriptor

1)

This unit covers the development of plans and policies to ensure regulatory requirements are met in conducting a contracting business, technical, occupational and workplace relation requirements associated with functions and responsibilities of a contracting business. It encompasses applying knowledge of technical regulations and standards, legislated obligations in relation to safety, the environment, heritage sites and employment and human resources.

Note:

This Unit should be undertaken in conjunction with UEENEEE018A Establish, maintain and evaluate OHS systems

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG005A      Verify compliance and functionality of general electrical installations

UEENEEE018A      Establish, maintain and evaluate OHS systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      5      Writing      5      Numeracy      5

### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to

occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to develop plans and compliance policies.

- 1.1 Factors influencing the performance of a contracting business are investigated and evaluated.
- 1.2 Information and advice is sought on the effects of legislated requirements on the operation of a contracting business.
- 1.3 Formal processes to meet technical, managerial, occupational and workplace relations' obligation in a contracting business are clearly identified.
- 1.4 Focus of the business is established from investigation of market opportunities and financial climate in which it is to operate

2 Develop plans and compliance policies.

- 2.1 Policies are established to ensure occupational aspects of work undertaken by the business met all legislated requirements and standards.
- 2.2 Policies are established to ensure technical aspects of work undertaken by the business met all legislated requirements and standards.
- 2.3 Policies are established to ensure managerial and workplace relations aspects of work undertaken by the business met all legislated requirements and standards.
- 2.4 Procedures and processes are developed to give effect to the established business policies including maintenance of currency in changes, developments and requirements.
- 2.5 Methods are incorporated in the business procedures to maintain currency with occupational, technical, managerial and workplace relations developments.
- 2.6 Policies, plans and procedures are reviewed in consultation with appropriately competent person(s) and changes made where agreed as necessary.

- 2.7 Plans, policies and procedures are documented in accordance sound management practice.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing plans and compliance policies to conduct a contracting business. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.23 Enterprise regulatory requirements and non regulatory standards
- 2.5.2.1 Technical standards, regulations and codes for general electrical installations
- 2.5.2.2 Technical standards, regulations and codes for special electrical installations
- 2.5.12 Electricity distributors, supply requirements
- 2.5.13 Electricity regulatory safety requirements
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing plans and compliance policies to conduct a small electrical contracting business

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best

utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry’s preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in

accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop plans and compliance policies to conduct a contracting business as described as described in 7) and including:
    - A Evaluating factors influencing the performance of a contracting business accurately.
    - B Identifying the formal processes for meeting legislated obligations.
    - C Establishing an appropriate focus for the business.
    - D Establishing policies to ensure all legislated requirements and standards are met.
    - E Developing procedures and processes to give effect to established policies.
    - F Giving written justification of solutions provided.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing plans and compliance policies to conduct a contracting business.

**Method of**

**8.4)**

**assessment**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE018A      Establish, maintain and evaluate OHS systems

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  2.6; 2.7	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  2.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.2	2
How are problem solving skills	Refer to the following Performance Criteria for examples of application:	

applied?	1.1; 1.2; 2.1 to 2.5	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  All	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  N/A
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  All
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEG015A Find and rectify faults in energy supply network equipment

### Unit Descriptor

1)

This unit covers finding and rectifying faults in energy supply network electrical equipment. It encompasses working safely, reading circuit and reticulation diagrams, applying logical fault finding procedures, following fault rectification procedures and completing the necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG008A Find and repair faults in electrical apparatus and circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired and is therefore not applicable to those entering work.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

#### Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to

currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to find and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.

- 2.5 Fault finding is approached methodically drawing on knowledge of energy network equipment using measured and calculated values of circuit/apparatus parameters.
  - 2.6 Circuit/apparatus components are dismantled where necessary and parts stored to protect them against loss or damage
  - 2.7 Faulty circuits/components are rechecked and their fault status and acquired.
  - 2.8 Materials/replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.
  - 2.9 Effectiveness of the repair is tested in accordance with established procedures.
  - 2.10 Apparatus is reassembled, finally tested and prepared for return to service.
  - 2.11 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.12 Fault finding and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault finding and repair activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.
  - 3.3 Maintenance work activities are documented in accordance with established procedures.
- Note.  
Examples of documentation are component faults reports, test results, authorisations, permits, and parts/component dispatch and stores records.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and rectifying faults in energy supply network equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.3 Fault finding techniques

- 2.6.21 Electricity supply and reticulation
- 2.6.22.1 Electrical power system protection
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by finding and rectifying any four of the following faults in at least four types of energy supply network equipment:

- Open-circuit
- Short-circuit
- Incorrect connections
- Insulation failure
- Unsafe condition
- Apparatus/component failure
- Related mechanical failure

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and rectify faults in energy supply network equipment as described as described in 7) and including:
    - A Envisaging the likely extent of work from fault/breakdown reports and discussion with appropriate person(s).
    - B Using methodical fault finding techniques.
    - C Finding faults efficiently.
    - D Rectifying faults effectively.
    - E Completing documentation correctly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and rectifying faults in energy supply network equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and

demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG008A Find and repair faults in electrical apparatus and circuits

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  N/A
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEG016A **Diagnose and rectify faults in lift systems**

### **Unit Descriptor**

1)

This unit covers diagnosing and rectifying faults in traction lift systems and equipment. It encompasses working safely, replacing and/or adjustment of lift circuit and associated components, diagnosing and repairing of faults in lift circuits and associated components (including governors, brakes, safety gear, safety devices, lift machines, door components and controllers) and releasing passengers from lifts which have become immobilised.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEG008A Find and repair faults in electrical apparatus and circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any formal recognition for this standard at the aligned AQF 3/4 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Electric

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to diagnose and rectify faults.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 The likely extend of work to be undertaken is envisaged from maintain procedures or fault/breakdown reports and/or discussions with appropriate person(s).</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Diagnose and rectify faults.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measured and devised and implemented in consultation with appropriate personnel.</p> <p>2.5 Logical diagnostic methods are applied to diagnose lift system apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements.</p> <p>2.6 Suspected fault scenarios are tested as being the cause(s) of system fault.</p>

- |   |  |  |  |
|---|--|--|--|
|   | 2.7  | Cause of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the lift systems.  |  |
|   | 2.8  | Faults in the lift components of the system are rectified to raise apparatus and system to its operational standard.   |  |
|   | 2.9  | System is tested to verify that the system operates as intended and to specified requirements  |  |
|   | 2.10   | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |  |
|   | 2.11   | Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |  |
| 3 | Completion and report fault diagnosis and rectification activities | 3.1  | OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2  | Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.  |
|   |  | 3.3  | Rectification of faults is documented in accordance with established procedures.   |
|   |  |  | Note.<br>Examples of documentation are components fault reports, test results, authorisations, permits, parts/component dispatch and store records |
|   |  | 3.4  | Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.                     |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in lifts systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.3	Technical standards, regulations and codes for lifts and escalators
2.6.46	Lift systems – basic operations
2.6.47	Lift components – electro-mechanical
2.6.48	Electric lifts – mechanics
2.6.49	Electro-hydraulic lifts
2.6.50	Electro-hydraulic lifts – mechanical operation
2.6.51	Emergency release procedures – trapped passengers
2.18.1	Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Competency shall be demonstrated in relation to diagnosing and rectifying faults in lift circuits and associated components for at least three (3) types of lift circuits/components as listed:

- Governors
- Brakes
- Safety gear
- Safety devices
- Lift machines
- Door components
- Controllers
- Release passengers from a lift, which has become immobilised

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in lift systems as described as described in 7) and including:
    - A Governors.
    - B Brakes.
    - C Safety gear.
    - D Safety devices.
    - E Lift machines.
    - F Door components.
  - Replace and/or adjustment of lift equipment in at least three types of lift equipment as described below
    - A Electro-hydraulic lift.
    - B Electric traction lift.
    - C Passenger lift.
    - D Goods lift.
    - E Dealing with unplanned events by drawing on

essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in lifts systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG008A Find and repair faults in electrical apparatus and circuits

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3 to 1.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 2.5; 2.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:	

	2.4 to 2.6	2
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEG017A **Install electrical power and control equipment for rail network signalling**

### Unit Descriptor

1)

This unit covers the installation of electrical protection devices, switchgear and controlgear and signalling control equipment used in rail networks and intended to operate at voltages up to 50 to 1,000 V a.c. or 1,500 V d.c. It encompasses safe working practices, regulatory requirements and following work procedures, matching equipment with that specified for a given location, terminating cables and connecting wiring and completing the necessary installation documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG003A Install wiring and accessories for low voltage circuits

Note:

This unit may be assessed with competency UEENEEG004A, Install low voltage electrical apparatus and associated equipment

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1	Prepare to install signal and power control equipment.	1.1	OHS procedures including Rail Safeworking for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures, including Rail Safeworking, in preparation for the work are followed.
		1.3	Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
		1.4	On Track safety controls and Isolation of equipment is appropriately sequenced in accordance with job schedule.
		1.5	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
		1.6	Location in which installation of equipment will occur is determined from job specifications and diagrams.
		1.7	Materials needed for the installation of equipment are obtained in accordance with established procedures and checked against job requirements.
		1.8	Tools, equipment and testing devices needed to Install and test power and control equipment are obtained in accordance with established procedures and checked for correct operation and safety.
		1.9	Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2	Install power and control equipment and wiring.	2.1	OHS risk control measures and procedures, including the On track safety requirements, for carrying out the work are followed.

- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
  - 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Power and control equipment are installed wiring terminated to comply with technical standards and job specifications and requirements.
  - 2.5 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
  - 2.6 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.7 Ongoing checks of the quality of installation, including wiring, are undertaken in accordance with established procedures.
  - 2.8 Installation work is carried out efficiently without unnecessary waste of materials and energy or damage to apparatus, circuits, the surrounding environment or services.
- 3 Completion and report installation activities.
- 3.1 OHS risk control work completion measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Testing is carried out to verify that circuits, apparatus and equipment conform to requirements.
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe installation of electrical protection devices, switchgear and controlgear and signalling control equipment used in rail networks and intended to operate at voltages up to 50 to 1000 V a.c. or 1,500 V d.c.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.7.2 Electrical installations, equipment requirements
- 2.14.1 Basic rail operations
- 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles

## 2.18.2 Electrical Safe working practices

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation of power and control equipment including:

- - At least six of the following signalling equipment components:
    - Termination Points
    - Signal Heads
    - Signal Relays
    - Points Machines
    - Level Crossing Equipment
    - Signal Panels
    - Track Circuit Equipment
    - Automatic Warning Systems
    - Automatic Train Protection Systems
    - Non-vital Electronic Equipment
    - Electronic Interlocking Systems
  - At least four of the following tests:
    - Earth leakage tests
    - Circuit Tests
    - Operational tests
    - Cable integrity tests
    - Continuity tests
    - Wire count

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry’s preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install electrical power and control equipment for rail network signalling as described as described in 7) and including:
    - A Reading and interpreting drawings related to and apparatus locations and circuit connections.
    - B Placing and securing apparatus accurately.
    - C Maintaining fire integrity.
    - D Connecting apparatus and associated equipment to comply with requirements.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions
- OHS policy and work procedures and instructions.
- On-track safety documentation as applied to Rail Safeworking
- Access to a Supervisor for obtaining work instructions and advice
- Work procedures relevant to work function and organisation
- As built documentation required for the Installation
- Personal Protective Equipment
- Installation tools and equipment
- Typical work environments
- Suitable work environment, facilities, equipment and materials

to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing electrical protection devices, switchgear and controlgear and signalling control equipment used in rail networks intended to operate at voltages up to 50 to 1000 V a.c. or 1,500 V d.c..

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE008A Install wiring and accessories for extra low voltage circuits.
- UEENEEG003A Install wiring and accessories for low voltage circuits
- UEENEEG004A Install low voltage electrical apparatus and associated equipment

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.1; 1.2	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5	1

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 2.9

## **UEENEEG018A Maintain operation of electrical mining equipment**

### **Unit Descriptor**

**1)**

This unit covers servicing of electrical systems and equipment in underground and open-cut mines. It encompasses working safely, applying knowledge of mining electrical systems and equipment, reading circuit and reticulation diagrams, applying logical fault diagnosis procedures, following fault rectification procedures and maintaining the necessary documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

- UEENEEG002A Solve problems in single and three phase low voltage circuits
- UEENEEG008A Find and repair faults in electrical apparatus and circuits
- UEENEEM002A Attend to breakdowns in hazardous areas'
- UEENEEM006A Maintain equipment in hazardous areas

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work and working in mines. Competencies in working in hazardous areas and with

explosion-protected equipment are required where the workplace includes hazardous areas such as underground coalmines.

Note:

UEENEEM002A Attend to breakdowns in hazardous areas' and UEENEEM006A Maintain equipment in hazardous areas' provide the required skill and knowledge to work in hazardous areas and with explosion-protected equipment relevant to this unit.

Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

**5)** Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to maintain operation of electrical mining equipment.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |  |      |   |
|---|--|------|---|
| 2 | Maintain operation of electrical mining equipment.                           | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |  | 2.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.                    |
|   |  | 2.3  | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.   |
|   |  | 2.4  | Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.               |
|   |  | 2.5  | Fault finding is approached methodically drawing on knowledge of mining electrical equipment and circuits using measured and calculated values of circuit/apparatus parameters. |
|   |  | 2.6  | Circuit/apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.  |
|   |  | 2.7  | Faulty circuits/components are rechecked and their fault status and acquired.   |
|   |  | 2.8  | Materials/replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.  |
|   |  | 2.9  | Effectiveness of the repair is tested in accordance with established procedures.  |
|   |  | 2.10 | Apparatus is reassembled, finally tested and prepared for return to service.  |
|   |  | 2.11 | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |  | 2.12 | Fault finding and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.      |
| 3 | Complete and report on maintaining operation of electrical mining equipment. | 3.1  | OHS work completion risk control measures and procedures are followed.  |

- 3.2 Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.
- 3.3 Maintenance work activities are documented in accordance with established procedures.

Note.

Examples of documentation are component faults reports, test results, authorisations, permits, and parts/component dispatch and stores records.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining operation of electrical mining equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.5.19 Technical standards, regulations and codes for mining
- 2.6.20 Electrical mining systems overview
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.6 Hazardous area safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to maintaining operation of electrical mining equipment by rectifying any four of the following faults in mining equipment and circuits.

- - Open-circuit
  - Short-circuit
  - Incorrect connections
  - Insulation failure
  - Unsafe condition
  - Apparatus/component failure
  - Related mechanical failure

Note:

1. Examples of apparatus are switchboards/distribution boards, protective devices such as circuit breakers, and earth leakage devices, control equipment, socket outlets, electric vehicles and motor starters and associated control devices.

2. Examples of circuits include those supplying fix equipment; lighting; motors; socket outlets; trailing cable and within electric vehicles.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain operation of electrical mining equipment as detailed as described in 7) and including:
    - A Envisaging the likely extent of work from fault/breakdown reports and discussion with appropriate person(s).
    - B Using methodical fault finding techniques.
    - C Finding faults efficiently.
    - D Rectifying faults effectively.
    - E Completing documentation correctly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and  
specific  
resources for  
assessment**
**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining operation of electrical mining equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE009A Comply with scheduled and preventative maintenance program processes
- UEENEEM002A Attend to breakdowns in hazardous areas
- UEENEEM006A Maintain equipment in hazardous areas

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6;
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEG019A **Maintain operation of electrical marine equipment**

### **Unit Descriptor**

1)

This unit covers the servicing of electrical systems and equipment on vessels and ships. It encompasses working safely, applying knowledge of marine electrical systems and equipment, reading circuit and reticulation diagrams, applying logical fault diagnosis procedures, following fault rectification procedures and maintaining the necessary operational documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG002A Solve problems in single and three phase low voltage circuits

UEENEEG008A Find and repair faults in electrical apparatus and circuits

UEENEEM002A Attend to breakdowns in hazardous areas'

UEENEEM006A Maintain equipment in hazardous areas

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work and maritime regulations.

Competencies in working in hazardous areas and with explosion-protected equipment are required where the workplace includes hazardous areas such as in gain handling and fuel pumping facilities.

Note:

UEENEEM002A Attend to breakdowns in hazardous areas' and UEENEEM006A Maintain equipment in hazardous areas' provide the required skill and knowledge to work in hazardous areas and with explosion-protected equipment relevant to this unit.

Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to maintain operation of electrical mining equipment.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |  |      |   |
|---|--|------|---|
| 2 | Maintain operation of electrical marine equipment.                           | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |  | 2.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.                    |
|   |  | 2.3  | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.   |
|   |  | 2.4  | Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.               |
|   |  | 2.5  | Fault finding is approached methodically drawing on knowledge of mining electrical equipment and circuits using measured and calculated values of circuit/apparatus parameters. |
|   |  | 2.6  | Circuit/apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.  |
|   |  | 2.7  | Faulty circuits/components are rechecked and their fault status and acquired.   |
|   |  | 2.8  | Materials/replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.  |
|   |  | 2.9  | Effectiveness of the repair is tested in accordance with established procedures.  |
|   |  | 2.10 | Apparatus is reassembled, finally tested and prepared for return to service.  |
|   |  | 2.11 | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |  | 2.12 | Fault finding and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.      |
| 3 | Complete and report on maintaining operation of electrical marine equipment. | 3.1  | OHS work completion risk control measures and procedures are followed.  |

- 3.2 Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.
- 3.3 Maintenance work activities are documented in accordance with established procedures.

Note.

Examples of documentation are component faults reports, test results, authorisations, permits, and parts/component dispatch and stores records.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining operation of electrical marine equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.17 Cells and batteries
- 2.6.23 Marine Electrical Systems overview
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to maintaining operation of electrical marine equipment by rectifying any four of the following faults in marine equipment and circuits.

- - Open-circuit
  - Short-circuit
  - Incorrect connections
  - Insulation failure
  - Unsafe condition
  - Apparatus/component failure
  - Related mechanical failure

Note:

1. Examples of apparatus are switchboards/distribution boards, protective devices such as circuit breakers, and earth leakage devices, control equipment, socket outlets, electric vehicles and motor starters and associated control devices.
2. Examples of circuits include those supplying fix equipment; lighting; motors; socket outlets; trailing cable and within electric vehicles.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

---

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain operation of electrical marine equipment as described as described in 7) and including:
    - A Envisaging the likely extent of work from fault/breakdown reports and discussion with appropriate person(s).
    - B Using methodical fault finding techniques.
    - C Finding faults efficiently.
    - D Rectifying faults effectively.
    - E Completing documentation correctly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in context of assessment, which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining operation of electrical marine equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE009A Comply with scheduled and preventative maintenance program processes

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEG020A **Select and arrange equipment for special electrical installations**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers selecting and arranging electrical equipment into distribution circuits for installations in caravan parks, construction and demolition sites, marinas, medical treatment areas and moveable premises operating at voltages up to 1,000V a.c. or 1,500 V d.c. The unit encompasses schemes for protection of persons and property, correct functioning, compatibility with the supply, arrangement of circuits and selection of switchgear, controlgear, protection devices and wiring based on calculated and deemed-to-comply solutions.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEG007A    Select and arrange equipment for general electrical installations</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Reading</td> <td style="width: 5%;">4</td> <td style="width: 25%;">Writing</td> <td style="width: 5%;">4</td> <td style="width: 25%;">Numeracy</td> <td style="width: 5%;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended as an additional competency to relevant competencies previously acquired and is therefore not applicable to those entering work.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p>						

## Electrical

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to select equipment.	1.1 The extent and nature of the electrical installation is determined from job specifications.  1.2 Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.
2 Arrange installation into circuits.	2.1 Circuits are arranged to ensure safe and functional operation of the installation.  2.2 Circuits are arranged to comply with technical standards and job specifications and requirements.  2.3 Earthing is arranged to comply with the MEN system requirements.
3 Select cables, protection and switchgear.	3.1 Wiring is selected for suitability for the environments in which they are installed.  3.2 Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and fault-loop impedance limitations.  3.3 Protection methods and devices are selected to meet co-ordination requirements for overload and short-circuit protection.  3.4 Switchgear and control gear is selected to meet current, voltage and IP ratings and functional requirements.  3.5 Earthing system components are selected to meet requirements of the MEN system.  3.6 Evidence is obtained that electrical equipment selected complies with safety requirements.
4 Document electrical installation.	4.1 Reasons for selections made, including calculations, are documented in accordance with established procedures.

- 4.2 Electrical installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and selecting and arranging equipment for special electrical installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.5.2.2 Technical standards, regulations and codes for special electrical installations
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by, selecting and arranging equipment for at least two of the following types of installations.

- - Caravan parks,
  - Construction and demolition sites.
  - Marinas,
  - Medical treatment areas,
  - Moveable premises

The electrical installations shall comprise consumer's mains, main earthing system and main switchboard and sub-mains, earthing system and distribution boards, final sub circuits and requirement particular to the installation type.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Select and arrange equipment for special electrical installations as described as described in 7) and including:
    - A Arranging electrical installations to comply with safety and other regulatory and functional requirements.
    - B Selecting appropriate type and size of cables.
    - C Selecting protection methods and devices that meet co-ordination requirements for overload and short-circuit protection.
    - D Selecting switchgear and control gear that meet current, voltage and IP ratings and functional requirements.
    - E Selecting appropriate earthing components.
    - F Documenting installation arrangement, specification

for items selected and reasons for the selections made.

- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in selecting and arranging equipment for special electrical installations

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENED001A Use basic computer applications relevant to a workplace
- UEENEEG007A Select and arrange equipment for general electrical installations

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2; to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: (See Note)	2

Note:  
Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEE001A Use basic computer applications'

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEG021A **Verify compliance and functionality of special electrical installations**

### Unit Descriptor

1)

This unit covers testing and visual inspection for verifying that an electrical installation in caravan parks, construction and demolition sites, marinas, medical treatment areas, moveable premises and HV installation in consumer’s premises are safe and comply with requirements. The unit encompasses procedures for safely conducting mandatory and optional tests, conducting visual inspections, identifying non-compliance defects and mandatory reporting requirements.

Note:

Competency in verifying compliance of installations for hazardous areas is covered by other units:

UEENEEM009A	Test installations in hazardous areas
UEENEEM010A	Conduct close inspection of existing hazardous areas installations
UEENEEM011A	Conduct detailed inspection of hazardous areas installations

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG005A	Verify compliance and functionality of general electrical installations
UEENEEG020A	Select and arrange equipment for special electrical installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs

under an approved contract of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to inspect and test an electrical installation.

- 1.1 OHS measures for the site are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
- 1.4 Documentation or deemed to comply standard on which installation is based is reviewed and understood.
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |                                    |  |  |
|---|------------------------------------|--|--|
|   | 1.7                                | Preparatory work is checked to ensure no damage has occurred and complies with requirements. |  |
| 2 | Visually inspect the installation. | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.   |
|   |                                    | 2.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures. |
|   |                                    | 2.3  | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.                                  |
|   |                                    | 2.4  | Wiring is checked for suitability for the environments in which they are installed and suitably protected from damage or overheating.                        |
|   |                                    | 2.5  | Cable conductor sizes are acquired as meeting current-carrying capacity requirements and voltage-drop and fault-loop impedance limitations.                  |
|   |                                    | 2.6  | Protection methods and devices are validated as meeting co-ordination requirements for overload and short-circuit protection.                                |
|   |                                    | 2.7  | Switchgear and control gear is validated as being appropriately rated and meeting functional requirements.   |
|   |                                    | 2.8  | Evidence that electrical equipment complies with safety requirements is cited.   |
|   |                                    | 2.9  | Earthing system components are checked that they are correctly located and conductors correctly sized.   |
|   |                                    | 2.10   | Marking on switchboards are checked for accuracy and clarity and comply with requirements.   |
| 3 | Conduct safety testing.            | 3.1  | OHS risk control measures and procedures for carrying out the work are followed.   |
|   |                                    | 3.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures. |
|   |                                    | 3.3  | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.                                  |

- |   |                                      |  |   |
|---|--------------------------------------|--|---|
|   | 3.4                                  | Mandatory tests are conducted to verify that: <ul style="list-style-type: none"> <li>• Earthing conductor resistance is sufficiently low</li> <li>• Insulation resistance is sufficiently high</li> <li>• Polarities are correct</li> <li>• Circuit connections are correct</li> <li>• Other tests required by a Standard</li> </ul> |   |
|   | 3.5                                  | Testing is conducted to verify that: <ul style="list-style-type: none"> <li>• Fault-loop impedance is sufficiently low</li> <li>• Residual current devices operate as intended.</li> </ul>   |   |
| 4 | Report inspection and test findings. | 4.1  | OHS risk control work completion measures and procedures are followed.                        |
|   |                                      | 4.2  | Work site is cleaned and made safe in accordance with established procedures.                 |
|   |                                      | 4.3  | Non-compliance defects are identified and reported in accordance with established procedures. |
|   |                                      | 4.4  | Recommendations for rectifying defects are made in accordance with established procedures.    |
|   |                                      | 4.5  | Mandatory documentation is completed in accordance with established procedures.               |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying compliance and functionality of special electrical installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.5.2.2 | Technical standards, regulations and codes for special electrical installations |
| 2.7.5.2 | Electrical installations, testing and verification of special installations     |
| 2.18.1  | Occupational Health and Safety principles                                       |
| 2.18.2  | Electrical Safe working practices   |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by verifying compliance and functionality of at least two of the following types of installations

- - Caravan parks
  - Construction and demolition sites
  - HV installation in consumer's premises
  - Marinas
  - Medical treatment areas
  - Moveable premises

The electrical installations shall comprise consumer's mains, main earthing system and main switchboard and sub-mains, earthing system and distribution boards, final sub circuits and requirement particular to the installation type.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be

‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Verify compliance and functionality of special electrical installations as describe as described in 7) and including:
    - A Selecting correct tools and testing equipment.
    - B Identifying visual non-compliance defects.
    - C Using effective methods for conducting mandatory and optional tests.

- D Identifying non-compliance from test results.
- E Identifying causes of non-compliance.
- F Completing mandatory reporting.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in verifying compliance and functionality of special electrical installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.10; 3.4; 3.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5; 2.6; 3.4; 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 4.4	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  3.4; 3.5	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3 to 4.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEG022A Conduct compliance inspection of single phase electrical installations

### Unit Descriptor

1)

This unit covers inspection of single phase domestic installations for demand not exceeding 100A for varying compliance with electrical safety regulations. It encompasses working safely, conducting tests and inspections, documenting non-compliance defects, taking/recommending actions resulting from non-compliance defects, applying regulatory requirements and completing inspection reports.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG005A Verify compliance and functionality of general electrical installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power

operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.  
 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to conduct compliance inspection.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate person(s).
- 1.4 Documentation or deemed to comply standard on which installation is based is reviewed and understood.
- 1.5 Appropriate person(s) are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety.

2 Conduct compliance inspect.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Detailed inspection of the consumer’s mains and main switchboard is conducted methodically to ascertain compliance of protection, metering, earthing, circuit arrangements and markings.
- 2.5 Detailed inspection of circuits is conducted methodically to ascertain the compliance of the installed wiring, accessories, switchgear / control gear and current-using devices.
- 2.6 Where deemed necessary, evidence that electrical equipment complies with safety requirements is sought from appropriate person(s) and sighted.
- 2.7 Detailed inspection is conducted to verify compliance of earthing, insulation, polarity, circuit connections and operation of Residual current devices.
- 2.8 Fault-loop impedance is ascertained as being sufficiently low by testing, calculation or deemed to comply arrangement of the installation.
- 2.9 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 3 Act and report on inspection findings.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Non-compliance defects are identified with appropriate clauses in regulatory standards and documented in accordance with established procedures.
  - 3.3 Actions are taken as a result of non-compliance within the scope of inspection responsibilities and authority and documented.
  - 3.4 Inspection report is made and issued to appropriate person(s) in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conducting compliance inspection of single phase electrical installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.2 Enterprise work activities records

2.2.5 Enterprise customer relations protocols

- 2.5.12 Electricity distributors, supply requirements
- 2.5.13 Electricity regulatory safety requirements
- 2.7.9.1 Electrical installations, single phase inspections
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by conducting compliance inspection of at least two domestic electrical installations comprising a single phase, two wire supply with a maximum demand not exceeding 100 amperes containing, consumers mains, main earthing system and those parts of a main switchboard related to the control of the installation and protection against spread of fire.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access

to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct compliance inspection of single phase electrical installations as described as described in 7) and including:

- A Obtaining appropriate documentation and equipment in preparation for the inspection.
- B Conducting Detailed inspections and testing methodically.
- C Identifying non-compliance defects.
- D Relating non-compliance defects with appropriate clause in regulatory standards.
- E Acting within the inspection authority when dealing with non-compliance defects.
- F Documenting and reporting inspection findings.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting compliance inspection of single phase electrical installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.4 to 2.8	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5; 2.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.7; 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.7; 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6; 3.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.9

## **UEENEEG023A      Conduct compliance inspection of electrical installations with demand exceeding 100 A per phase**

### **Unit Descriptor**

1)

This unit covers inspection of general electrical installations for verifying compliance with electrical safety regulations. It encompasses working safely, conducting tests and inspections, documenting non-compliance defects, taking/recommending actions resulting from non-compliance defects, applying regulatory requirements and completing inspection reports.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG022A      Conduct compliance inspection of single phase electrical installations

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to conduct compliance inspection.</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate person(s).</p> <p>1.4 Documentation or deemed to comply standard on which installation is based is reviewed and understood.</p> <p>1.5 Appropriate person(s) are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.6 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety.</p>
<p>2 Conduct compliance inspect.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p>

- 2.4 Detailed inspection of the consumer's mains and main switchboard is conducted methodically to ascertain compliance of protection, metering, earthing, circuit arrangements and markings.
- 2.5 Detailed inspection of circuits is conducted methodically to ascertain the compliance of the installed wiring, accessories, switchgear / control gear and current-using devices.
- 2.6 Where deemed necessary, evidence that electrical equipment complies with safety requirements is sought from appropriate person(s) and sighted.
- 2.7 Detailed inspection is conducted to verify compliance of earthing, insulation, polarity, circuit connections and operation of Residual current devices.
- 2.8 Fault-loop impedance is ascertained as being sufficiently low by testing, calculation or deemed to comply arrangement of the installation.
- 2.9 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 3 Act and report on inspection findings.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Non-compliance defects are identified with appropriate clauses in regulatory standards and documented in accordance with established procedures.
  - 3.3 Actions are taken as a result of non-compliance within the scope of inspection responsibilities and authority and documented.
  - 3.4 Inspection report is made and issued to appropriate person(s) in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conducting compliance inspection of electrical installations with demand exceeding 100 A per phase. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.7.9.2 Electrical installations, inspections and safety compliance audits
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by conducting compliance inspection of at least two electrical installations comprising consumers mains, main earthing system and main switchboard and sub-mains, earthing system and distribution boards related to the control of an individual occupier's portion of a multiple installation and final sub circuits.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the

workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct compliance inspection of electrical installations with demand exceeding 100 A per phase as described in 7) and including:
    - A Obtaining appropriate documentation and equipment in preparation for the inspection.
    - B Conducting detailed inspections and testing methodically.
    - C Identifying non-compliance defects.
    - D Relating non-compliance defects with appropriate clause in regulatory standards.
    - E Acting within the inspection authority when dealing with non-compliance defects.
    - F Documenting and reporting inspection findings.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting compliance inspection of electrical installations with demand exceeding 100 A per phase.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and

demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.4 to 2.8	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5; 2.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.7; 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.7; 2.8	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2 to 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6; 3.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9

# UEENEEG024A Conduct compliance inspection of special electrical installations

## Unit Descriptor

1)

This unit covers inspection of electrical installation in marinas, moveable premises and caravan parks, medical treatment centres, construction and demolition sites and HV installation in consumer’s premises for verifying compliance with electrical safety regulations. It encompasses working safely, conducting tests and inspections, documenting non-compliance defects, taking/recommending actions resulting from non-compliance defects, applying regulatory requirements and completing inspection reports.

Note:

Competency in verifying compliance of installations for hazardous areas is covered by units:

- UEENEEM009A Test installations in hazardous areas
- UEENEEM010A Conduct close inspection of existing hazardous areas installations
- UEENEEM011A Conduct detailed inspection of hazardous areas installations

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

- UEENEEG021A Verify compliance and functionality of special electrical installations
- UEENEEG023A Conduct compliance inspection of electrical installations with demand exceeding 100 A per phase

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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## Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of

training at the aligned AQF 4 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to conduct compliance inspection.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate person(s).
- 1.4 Documentation or deemed to comply standard on which installation is based is reviewed and understood.
- 1.5 Appropriate person(s) are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |  |     |  |
|---|--|-----|--|
| 2 | Conduct compliance inspect.            | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.   |
|   |  | 2.2 | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.                             |
|   |  | 2.3 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |
|   |  | 2.4 | Detailed inspection of the consumer’s mains and main switchboard is conducted methodically to ascertain compliance of protection, metering, earthing, circuit arrangements and markings. |
|   |  | 2.5 | Detailed inspection of circuits is conducted methodically to ascertain the compliance of the installed wiring, accessories, switchgear / control gear and current-using devices.         |
|   |  | 2.6 | Where deemed necessary, evidence that electrical equipment complies with safety requirements is sought from appropriate person(s) and sighted.   |
|   |  | 2.7 | Detailed inspection is conducted to verify compliance of earthing, insulation, polarity, circuit connections and operation of Residual current devices.                                  |
|   |  | 2.8 | Fault-loop impedance is ascertained as being sufficiently low by testing, calculation or deemed to comply arrangement of the installation.   |
|   |  | 2.9 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |
| 3 | Act and report on inspection findings. | 3.1 | OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2 | Non-compliance defects are identified with appropriate clauses in regulatory standards and documented in accordance with established procedures.   |
|   |  | 3.3 | Actions are taken as a result of non-compliance within the scope of inspection responsibilities and authority and documented.  |
|   |  | 3.4 | Inspection report is made and issued to appropriate person(s) in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conducting compliance inspection of special electrical installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.2.2 Technical standards, regulations and codes for special electrical installations

2.18.1 Occupational Health and Safety principles

2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by conducting compliance inspection of at least three of the following types of installations.

- Caravan parks,
- Construction and demolition sites,
- HV installation in consumer's premises
- Marinas,
- Medical treatment areas,
- Moveable premises

The electrical installations shall comprise consumers' mains, main earthing system and main switchboard and sub-mains, earthing system and distribution boards, final sub circuits and requirement particular to the installation type.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct compliance inspection of special electrical installations as described in 7) and including:
    - A Obtaining appropriate documentation and equipment in preparation for the inspection.
    - B Conducting Detailed inspections and testing methodically.
    - C Identifying non-compliance defects.
    - D Relating non-compliance defects with appropriate clause in regulatory standards.
    - E Acting within the inspection authority when dealing with non-compliance defects.
    - F Documenting and reporting inspection findings.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting compliance inspection of special electrical installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.4 to 2.8	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 2.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.7; 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.7; 2.8	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6; 3.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9

## **UEENEEG025A Plan electrical installations with a LV demand up to 400A per phase**

### **Unit Descriptor**

**1)**

This unit covers the planning of circuit and equipment for electrical installations where standardised arrangements for service and CT metering equipment are used, not exceeding 400 A per phase. This encompasses schemes for protection of persons and property, correct functioning, compatibility with the supply, arrangement of circuits, metering and control, cable route planning, specifying type and rating of switchgear, controlgear, protection devices and wiring based on calculated and deemed-to-comply solutions and planning documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG007A Select and arrange equipment for general electrical installations

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 4 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

### **Competency Field**

**4)**

## Electrical

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to plan electrical installations.	<p>1.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>1.2 The extent and nature of the electrical installation is determined from job specifications.</p> <p>1.3 Safety and other regulatory requirements to which the electrical installation shall comply are identified, obtained and understood.</p> <p>1.4 Electricity tariffs required are discussed with appropriate person(s) to ascertain control and metering needs of the installation.</p>
2 Arrange installation circuits, control and metering.	<p>2.1 Circuits are arranged to ensure safe and functional operation of the installation.</p> <p>2.2 Circuits are arranged to comply with technical standards and job specifications and requirements.</p> <p>2.3 Control and metering of the installation is arranged in accordance with regulatory and local requirements and consumer needs.</p> <p>2.4 Earthing is arranged to comply with the standards and local energy supplier's requirements.</p>
3 Specify cables, protection and switchgear.	<p>3.1 Fault levels at each relevant point of the installation are determined from calculations and/or information from the local energy supplier's.</p> <p>3.2 Suitability of the wiring systems selected is determined to meet requirements for protection against environmental factors and job specifications.</p> <p>3.3 Cable conductor sizes are determined to meet current-carrying capacity requirements and voltage-drop and fault-loop impedance limitations and short circuit performance.</p> <p>3.4 Protection methods and devices are specified to meet co-ordination requirements for overload and short-circuit protection.</p>

- |   |  |  |  |
|---|--|--|--|
|   | 3.5                                    | Switchgear and control gear are specified to meet fault levels, current, voltage and IP ratings and functional requirements. |  |
|   | 3.6                                    | Earthing system components are specified to meet requirements of the earthing system used.                                   |  |
|   | 3.7                                    | Evidence is obtained that electrical equipment selected complies with safety requirements.                                   |  |
| 4 | Document electrical installation plan. | 4.1  | Equipment specified for the installation is documented together with supporting calculations in accordance with established procedures.  |
|   |  | 4.2  | Electrical installation arrangement, equipment locations, cable routes and schedules and requirements are documented in accordance with established procedures and forwarded to appropriate person(s). |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and planning electrical installations with a LV demand up to 400A per phase. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |         |  |
|--|---------|--|
|  | 2.6.2.2 | Electrical metering arrangements                                   |
|  | 2.7.3   | Electrical installations, safety principles and requirements       |
|  | 2.7.4.1 | Electrical installations – protection methods and devices          |
|  | 2.7.4.2 | Electrical installations, circuit arrangements and cable selection |
|  | 2.18.1  | Occupational Health and Safety principles                          |
|  | 2.18.2  | Electrical Safe working practices                                  |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to planning electrical installations with a LV demand up to 400A per phase. The installation shall comprise a main switchboard CT metering, multiple tariffs or tenants, distribution boards single and three phase final sub circuits.

The electrical installations shall comprise consumers' mains, main earthing system and main switchboard and sub-mains, earthing system and distribution boards, final sub circuits and requirement particular to the installation type.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be

‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan electrical installations with a LV demand up to 400A per phase as described in 7) and including:
    - A Arranging electrical installations to comply with control, metering, safety and other regulatory and functional requirements.
    - B Specifying appropriate type and size of cables.

- C Specifying protection methods and devices that meet co-ordination requirements for overload and short-circuit protection.
- D Specifying switchgear and control gear that meet fault level, current, voltage and IP ratings and functional requirements.
- E Selecting appropriate earthing system components.
- F Documenting installation plan, specifications of equipment, equipment locations, cable routes and schedules and supporting calculations.
- G Arranging electrical installations to comply with control, metering, safety and other regulatory and functional requirements.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in planning electrical installations with a LV demand up to 400A per phase.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED001A Use basic computer applications'

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2
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Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEED001A Use basic computer applications'

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEG026A    Install and maintain field power and distribution systems with a LV demand up to 200 A per phase**

### **Unit Descriptor**

**1)**

This unit covers the installation of electrical power intended to operate at voltages to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to standards, positioning site generator sets, routing cables to specified locations, matching equipment with that specified for a given location terminating cables and connecting accessories and completing the necessary installation documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG007A    Select and arrange equipment for general electrical installations

UEENEEG008A    Find and repair faults in a.c. electrical apparatus and circuits

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install and maintain field power and distribution systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Nature of the work and location of power equipment is determined by site inspection and from job instructions, specifications and/or diagrams.
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Materials needed for the installation, maintenance/repair work are obtained in accordance with established procedures and checked against job requirements.
- 1.7 Tools, equipment and testing devices needed to install or maintain/repair power supplies are obtained in accordance with established procedures and checked for correct operation and safety.

2 Install field power and distribution systems.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 Generator set are located and installed to comply with technical standards and job specifications and requirements.
  - 2.3 Cable sets are selected to comply with load requirements and voltage drop limitations.
  - 2.4 Cable sets are installed terminated to comply with technical standards and job specifications and requirements.
  - 2.5 Tests are conducted to ensure installed power supply complies with specifications and functions as intended.
  - 2.6 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
  - 2.7 Installation of power supply is carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Maintain/repair field power and distribution systems.
- 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Correct functioning of equipment is established from reference to manuals, system specifications and commissioning data.
  - 3.3 Faults are identified by reference to appropriate technical information and applying knowledge of field power and distribution systems to logical fault finding techniques.
  - 3.4 Faulty, worn, damaged or insecure components are replaced, repaired or secured in accordance with manufacturer's specifications and enterprise requirements.
  - 3.5 Tests are conducted to ensure maintained/repared power and distribution system complies with specifications and functions as intended.
  - 3.6 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.

	3.7	Maintenance and repair of power and distribution system is carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
4 Complete installation and maintenance of field power and distribution systems.	4.1	OHS work completion risk control measures and procedures are followed.
	4.2	Work site is cleaned and made safe in accordance with established procedures.
	4.3	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintaining field power and distribution systems with a LV demand up to 200 A per phase. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.3	Single phase alternators
2.6.4	Three phase alternators
2.6.32	Field power and distribution systems
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing and maintaining at least two field power and distribution systems with a LV demand up to 200 A per phase. The installation shall comprise a generator set, main switchboard, earthing system, at least one distribution board, flexible cable/plug sets, final sub circuits supplying lighting and power. One installation is to include a three phase load.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and maintain field power and distribution systems with a LV demand up to 200 A per phase as described in 7) and including:
    - A Interpreting specifications and circuit diagrams correctly.
    - B Maintaining, repairing and installing power and distribution systems correctly.
    - C Using appropriate diagnostic and fault finding techniques.
    - D Following relevant codes of practice, procedures and requirements.
    - E Completing relevant records and documentation.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and maintaining field power and distribution systems with a LV demand up to 200 A per phase.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

**Key competencies**
**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3 to 1.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5; 3.5	1

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEE001A Use basic computer applications'

**Skills Enabling Employment**
**8.7)**

Evidence that competency in this unit incorporates skills enabling

employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1 to 3.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.6

## **UEENEEG027A Design electrical installations with a LV demand greater than 400 A per phase**

### **Unit Descriptor**

1)

This unit covers the design of supply and distribution arrangements, control, protection and selection of equipment for electrical installations with low voltage demand greater than 400 amperes per phase. This encompasses designing schemes for protection of persons and property and correct functioning, compatibility with the supply, and arrangement of circuits, determination of fault levels, effective switchgear, control gear, and protection against over current and over and under voltage and wiring based on calculations to meet required safety and performance standards and functional requirements.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG025A Plan electrical installations with a LV demand up to 400A per phase

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to plan electrical installations.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 The extent and nature of the electrical installation is determined from design brief.
- 1.3 Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.
- 1.4 Design development work is planned to meet scheduled timelines in consultation with others persons involved in the installation or associated work.

2 Develop installation design.

- 2.1 Knowledge of electrical installation performance standards, compliance methods and electrical equipment and is applied to designing the installation.
- 2.2 Alternative arrangements for the installation design are considered based on the requirements outlined in the design brief.
- 2.3 Safety, functional and budgetary considerations are incorporated in the installation design.
- 2.4 Installation design draft is checked for compliance with the design brief and regulatory requirements.
- 2.5 Installation design is documented for submission to appropriate person(s) for acceptance and approval.

	2.6	Solutions to unplanned situation are provided consistent with organisation’s policy.
3 Obtain approval for installation design.	3.1	Installation design is presented and explained to client representative and/or other relevant person(s).
	3.2	Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation’s policy.
	3.3	Final design is documented and approval obtained from appropriate person(s).
	3.4	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing electrical installations with a LV demand greater than 400 A per phase. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.12	Electricity distributors, supply requirement
2.7.4.3	Electrical installations, advanced methods of cable and protection selection
2.7.5.1	Electrical installations, testing and verification
2.7.5.2	Electrical installations, testing and verification of special installations
2.7.10	Electrical installations, determination of demand
2.7.11	Electrical installations, overcurrent protection
2.7.12	Electrical installations, overvoltage and undervoltage protection
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing electrical installations with a LV demand in excess of 400A per phase. The installation shall comprise main switchboard,

multiple tenancies, distribution boards and single and three-phase final sub circuits.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design electrical installations with a LV demand greater than 400 A per phase as described in 7) and including:
    - A Developing outlines of alternative designs.
    - B Developing the design within the safety and functional requirements and budget limitations.
    - C Documenting and presenting design effectively.
    - D Successfully negotiating design alteration requests.
    - E Obtaining approval for final design.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing electrical installations with a LV demand greater than 400 A per phase.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEE001A      Use basic computer applications'

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.3, 4.1; 4.2	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEE001A Use basic computer applications'

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling

employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEG028A Plan switchboard and control panel layouts

### Unit Descriptor

1)

This unit covers selecting and arranging equipment in electrical switchboards and control panels operating at voltages up to 1,000V a.c. or 1,500 V d.c. and fault levels not exceeding 20 kA. The unit encompasses arrangements for protection of persons and property, correct functioning, compatibility with the supply, and intended arrangement of circuits and selection of switchgear, controlgear and protection devices based on calculated and deemed-to-comply solutions and planning documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG007A Select and arrange equipment for general electrical installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

### Competency Field

4)

Electrical

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to plan switchboard and control panel layouts.	<p>1.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>1.2 The extent and nature of the switchboard and control panel layouts is determined from job specifications or design brief.</p> <p>1.3 Safety and other regulatory requirements to which the switchboard and control panel layouts shall comply are identified, obtained and understood.</p> <p>1.4 Equipment to be incorporated in the switchboard or control panel is determined from job specifications or design brief.</p>
2 Plan switchboard and control panel layouts.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Equipment is selected that complies with technical standards and job specifications and requirements.</p> <p>2.3 Switchboard and control panel layouts are planned to accommodate all necessary equipment with sufficient clearance to enable wiring/connecting and servicing with constraints imposed by job specifications.</p> <p>2.4 Switchboard and control panel layouts are planned to comply with safety regulatory and functional requirements.</p> <p>2.5 Switchboard and control panel layout draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.6 Switchboard and control panel layout is documented for submission to appropriate person(s) for acceptance and approval.</p> <p>2.7 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p>

- |   |  |     |  |
|---|--|-----|--|
| 3 | Obtain approval for switchboard and control panel layouts. | 3.1 | Requests for alterations to the layout are negotiated with relevant person(s) within the constraints of organisation's policy. |
|   |  | 3.2 | Final layout design is documented and approval obtained from appropriate person(s).  |
|   |  | 3.3 | Switchboard and control panel layout documentation is forwarded to appropriate production personnel.                           |
|   |  | 3.4 | Quality of work is monitored against established organisational standards  |

### REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and planning switchboard and control panel layouts. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.3.1    | Electrical control devices                |
| 2.6.1    | Protection devices and applications       |
| 2.6.2.1  | Switchboards / distribution boards        |
| 2.6.2.2  | Electrical metering arrangements          |
| 2.6.24.1 | Switchgear/controlgear                    |
| 2.6.24.2 | Control panel wiring                      |
| 2.18.1   | Occupational Health and Safety principles |
| 2.18.2   | Electrical Safe working practices         |

### RANGE STATEMENT

- 7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to planning one switchboard layout and one control panel layout. The switchboard shall be in more than one section and comprise essential and general supply controls, CT metering, sub main controls, local distribution board and load monitoring and fault indication. The control panel shall consist of controls for more than two electrical machines, electro-mechanical and/or electronic control devices such as relays, timers, logic controllers, indicators and switches/push buttons.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry’s preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan switchboard and control panel layouts as described in 7) and including:
    - A Developing outlines of alternative layouts.
    - B Selecting equipment that complies with safety and functional requirements and budget limitations.
    - C Developing the layout within the safety and functional requirements and budget limitations.
    - D Successfully negotiating layout alteration requests.
    - E Obtaining approval for final layout design..
    - F Documenting layout and equipment specifications clearly.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and  
specific  
resources for****8.3)**

This unit should be assessed as it relates to normal work practice

**assessment** using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in planning switchboard and control panel layouts.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED001A      Use basic computer applications’

**Key competencies****8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEE001A Use basic computer applications'

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling

employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEG029A Overhaul and repair major switchgear/controlgear

### Unit Descriptor

1)

This unit covers the overhauling and repairing switchgear/controlgear rated in excess of 20 kA. It requires the ability to establish and document the level of work required, arranging for the overhaul/repair to be carried out, verify compliance of overhauled/repared switchgear/controlgear and complete the necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG064A Repair mechanical components of electrical machines

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and switchgear/control gear operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare for overhaul/repair of switchgear/control gear.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Instructions on the extent of overhaul and/or repair are received and expected outcomes of the work acquired with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Switchgear/control gear service and repair documentation is read and understood.
- 1.7 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.8 Tools, equipment and testing devices needed to work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Overhaul switchgear/control gear.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |                                |  |
|---|--------------------------------|--|
|   | 2.4                            | Switchgear and control gear is dismantled and parts tagged and stored to prevent loss or damage.   |
|   | 2.5                            | The state of switchgear/control gear components is determined by measurements, tests and inspections and results recorded.                                 |
|   | 2.6                            | Materials/replacement parts required to complete the work are sourced and obtained in accordance with established procedures.                              |
|   | 2.7                            | Effectiveness of the repairs is tested in accordance with established procedures.  |
|   | 2.8                            | Specifications and instructions for the overhaul/repair work are documented in accordance with requirements.   |
| 3 | Document overhaul/repair work. | 3.1 OHS work completion risk control measures and procedures are followed.   |
|   |                                | 3.2 Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.  |
|   |                                | 3.3 Overhaul/repair work is documented in accordance with requirements stating that the switchgear/control gear complies with the overhaul specifications. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and overhauling and repairing major switchgear/controlgear. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.6.24.1 | Switchgear/controlgear                                   |
| 2.7.4.1  | Electrical installations, protection methods and devices |
| 2.18.1   | Occupational Health and Safety principles                |
| 2.18.2   | Electrical Safe working practices                        |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to overhauling at least one type of low voltage switchgear/control gear rated above 200 A and any high voltage switchgear/control gear.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to

consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Overhaul and repair major switchgear/controlgear as described in 7) and including:
    - A Interpreting service and repair documentation correctly.
    - B Determining the state of switchgear/control gear correctly.
    - C Repairing switchgear/control gear effectively.
    - D Completing documentation correctly.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in overhauling and repairing major switchgear/controlgear.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- |             |  |
|-------------|--|
| UEENEEC001A | Maintain documentation   |
| UEENEEC002A | Source and purchase material for installation and service jobs |

**Key competencies****8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 4.1; 4.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.2	2

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEE001A Use basic computer applications'

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling

employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEG030A Design switchboards rated for high fault levels

### Unit Descriptor

1)

This unit covers the design of supply and distribution arrangements, control, protection and selection of equipment for switchboards with low voltage demand greater than 400 amperes per phase. This encompasses designing schemes for protection of persons and property and correct functioning, compatibility with the supply, and arrangement of circuits, determination of fault levels, effective switchgear, control gear, and protection against over current, over and under voltage and wiring based on calculations to meet required safety and performance standards and functional requirements.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG028A Plan switchboard and control panel layouts

UEENEEG049A Solve problems in complex polyphase power circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to plan switchboards.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 The extent and nature of the switchboard is determined from design brief.
- 1.3 Safety and other regulatory requirements to which the switchboard shall comply area are identified, obtained and understood.
- 1.4 Design development work is planned to meet scheduled timelines in consultation with others persons involved in the installation or associated work.

2 Develop installation design.

- 2.1 Knowledge of switchboard performance standards, compliance methods and electrical equipment and is applied to designing the installation.
- 2.2 Alternative arrangements for the switchboard design are considered based on the requirements outlined in the design brief.
- 2.3 Safety, functional and budgetary considerations are incorporated in the installation design.
- 2.4 Switchboard design draft is checked for compliance with the design brief and regulatory requirements.
- 2.5 Switchboard design is documented for submission to appropriate person(s) for acceptance and approval.

	2.6	Solutions to unplanned situation are provided consistent with organisation's policy.
3 Obtain approval for installation design.	3.1	Switchboard design is presented and explained to client representative and/or other relevant person(s).
	3.2	Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation's policy.
	3.3	Final design is documented and approval obtained from appropriate person(s).
	3.4	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing switchboards rated for high fault levels. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.8	Electrotechnology science and materials
2.8.2.2	Alternating current principles - power
2.8.15.3	Fault current calculations
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing switchboards rated for fault levels in excess of 20 kA. The switchboard shall comprise control for essential and general supply, metering, sub-main controls, local final sub-circuit distribution board and fault monitoring.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects  
of evidence  
required to  
demonstrate  
competency in  
this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design switchboards rated for high fault levels as described in 7) and including:
    - A Developing outlines of alternative designs.
    - B Developing the design within the safety and functional requirements and budget limitations.
    - C Documenting and presenting design effectively.
    - D Successfully negotiating design alteration requests.
    - E Obtaining approval for final design.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and 8.3)**

**specific resources for assessment**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing switchboards rated for high fault levels.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEE004A      Use engineering applications software

**Key competencies****8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEE001A Use basic computer applications'

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling

employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEG031A Evaluate performance of electrical apparatus

### Unit Descriptor

1)

This unit covers testing of electrical apparatus for compliance with a standard and regulation for the purpose of certification, approval and/or product quality maintenance. The unit encompasses safe working practices, determining performance requirements, inspecting, setting up performance tests, evaluating inspection and test results and documenting test outcomes.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

This unit shall be assessed with other relevant units in a qualification.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

#### Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices and

- site rehabilitation.
- 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to evaluate electrical apparatus

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Examination and testing area is checked for safety hazards and risk control measures implemented in strict accordance with safety policy and procedures.
- 1.4 Relevant documentation is obtained and read to determine the certification/approval specifications for which the equipment is to be assessed.

Note:  
Examples of documentation are those specifying safety requirements, technical standard, as marketed technical performance and product quality endorsement standards.

2 Evaluate electrical apparatus

- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety.
- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Circuits/apparatus/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 In depth knowledge of the performance requirements of electrical apparatus and testing methods are applied to the assessment process.

	2.5	Apparatus examination and tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny.
	2.6	Apparatus examination and tests are carried out methodically and results and comments systematically noted.
	2.7	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.8	Assessment is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practices.
3	Complete work and document evaluate results	3.1 OHS work completion risk control measures and procedures are followed.
		3.2 Work site is cleaned and made safe in accordance with established procedures.
		3.3 Examination and test results are evaluated and non-compliance issues identified.
		3.4 Examination, test results and comments on non-compliance issues are documented and reported to appropriate person(s) in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and evaluating performance of electrical apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.23	Performance standards and regulatory requirement for electrical equipment
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to at least two different current-using apparatus and two different control apparatus.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Evaluate performance of electrical apparatus as described in 7) and including:
    - A Interpreting compliance documents.
    - B Setting up and conducting appropriate examinations and tests.
    - C Identifying non-compliance issues.
    - D Reporting examination and test results and non-compliance issues clearly and accurately.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

**assessment**

This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in evaluating performance of electrical apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	3
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEED001A Use basic computer applications'

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3; 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEG032A Carry out electrical field testing and report findings

### Unit Descriptor

1)

This unit covers field testing of electrical systems, circuits and apparatus to determine the cause of faults, malfunctions or compliance. It encompasses working safely and to standards, applying knowledge of electrical measurement and testing, following appropriate test procedures, documenting, evaluating and reporting test results.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG005A Verify compliance and functionality of general electrical installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting

equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to Carry out electrical field testing.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The likely extent of work to be undertaken is envisaged from situation reports and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Carry out electrical field testing.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.

- |   |  |   |   |
|---|--|---|---|
|   | 2.5  | Field testing and measuring is approached methodically drawing on knowledge of electrical systems, circuits, apparatus and testing/measuring techniques appropriate to each test and situation. |   |
|   | 2.6  | Circuit apparatus/components are dismantled where necessary to facilitate testing and parts stored to protect them against loss or damage.  |   |
|   | 2.7  | Tests required are determined from situation report and appropriate testing/measuring instruments selected and set up in accordance with manufacturer's instructions and industry standards.    |   |
|   | 2.8  | Unexpected situations are dealt with safely and with the approval of an authorised person.  |   |
|   | 2.9  | Testing activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.                                       |   |
| 3 | Complete electrical field testing and report findings. | 3.1   | OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2   | Apparatus is reassembled after testing where necessary, and work area is cleaned and made safe in accordance with established procedures.     |
|   |  | 3.3   | Test findings are reported including recommendation for any action to be taken to rectify/modify conditions or parameters shown by the tests. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out electrical field testing and report findings. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |   |
|--|----------|---|
|  | 2.2.1    | Enterprise communication methods                    |
|  | 2.2.2    | Enterprise work activities records                  |
|  | 2.11.6.1 | Advance electrical testing and measuring devices    |
|  | 2.11.6.2 | Electrical field testing and measurement techniques |
|  | 2.11.6.3 | Power cable fault detection techniques              |

2.18.1 Occupational Health and Safety principles

2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out and reporting findings of electrical field tests for the purpose of:

- Locating faults
- Examining operating parameters
- Accessing compliance with regulations
- Evaluating quality compliance

Note.

Examples of tests are earth system testing including HV installations; Varley loop testing; earth resistance measurements in electro-medical areas; temperature rise and thermography; circuit breaker residual current testing; illumination measurements and interpretation; industrial power factor measurements; radiation leakage in microwave ovens; antennae field strength measurement

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Carry out electrical field testing and report findings as described in 7) and including:
  - A Envisaging the extent of work from situation reports and discussion with appropriate person(s).
  - B Using methodical testing techniques appropriate to each type of test and situation.
  - C Selecting and setting up appropriate testing/measuring instruments in accordance with manufacturer’s instructions and industry standards.
  - D Writing test findings and recommendations of actions to be taken.
  - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out electrical field testing and report findings.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.5; 2.7	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.7	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.8; 3.3	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	3

Note:  
Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEE001A Use basic computer applications'

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4 to 2.8; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## UEENEEG034A Perform high voltage field switching to a given schedule

### Unit Descriptor

1)

This unit covers the carrying out of high voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule and according to enterprise procedures. It also encompasses the process of; communicating with the Switching Control Officer or Electrical Control Officer, isolating the electrical equipment and the line or work site, as well as proving that the area is de-energised and earthed, issuing/accepting electrical permits and the returning of the affected circuits to service.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been acquired.

UEENEEG015A Find and rectify faults in energy supply network equipment

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit are not subject to licence regulation other than those directly related to occupational health and safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

**Competency Field      4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to undertake HV switching procedures to a given schedule

- 1.1 Switching and work schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and acquired, if necessary, by site inspection
- 1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites
- 1.3 OHS policies and procedures related to requirements and established procedures for HV switching are obtained and acquired for the purposes of the work to be performed and communicated
- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant authority is obtained to perform work according to requirements and/or established procedures
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and acquired in working order.
- 1.8 Relevant personnel at worksite are acquired current in First Aid and other related work procedures according to requirements
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved to carry out work where necessary.

- |   |   |   |  |
|---|---|---|--|
|   | 1.10  | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures                                      |  |
|   | 1.11  | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities acquired where applicable in accordance with established procedures |  |
|   | 1.12  | Road signs, barriers and warning devices are positioned in accordance with requirements   |  |
| 2 | Carry out HV switching procedures to a given schedule | 2.1   | OHS and Sustainable Energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures   |
|   |   | 2.2   | Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements acquired   |
|   |   | 2.3   | Apply essential knowledge and associated skills for the safe undertaking of HV switching procedures to a given schedule to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements            |
|   |   | 2.4   | Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures  |
|   |   | 2.5   | Electrical equipment and associated circuits line/network or work site to be switched including parallelling is isolated and proved de-energised using appropriate devices and earthed where required according to requirements and established procedures |
|   |   | 2.6   | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.  |
|   |   | 2.7   | Unplanned events occurring during HV switching procedures to a given schedule are responded to and undertaken within the scope of established procedures   |
|   |   | 2.8   | Relevant permits are prepared and issued in accordance with established procedures   |

	2.9	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.10	On going checks of quality of the work are undertaken in accordance with instructions and established procedures
3	Complete HV switching procedures to a given schedule	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3	Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant permit(s) are signed off, safety devices are removed, and the system is re-energised and returned to service in accordance with requirements/established procedures
	3.6	Works completion records, reports, as installed /modified drawing and / or documentation and information are finalised and processed and appropriate personnel and authority notified

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and perform high voltage field switching to a given schedule. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

T2.4.3	High voltage switching principles
T2.4.4	High voltage fault switching principles
T2.4.5	High voltage distribution transformer principles
T2.4.6	High voltage SWER system
T2.4.7	Feeder automation system
2.18.1	Occupational Health and Safety principles

## 1.18.2 Electrical Safe working practices

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall/may be demonstrated in relation to the carrying out of high voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule.

Switching operations are confined to those performed in field situations, not in system control rooms or substations and may include electrical load transfer.

Switchgear includes reclosers, ring main units, circuit breakers, isolators, earth switches, sectionalisers, HV links, air break switches, live line clamps, and fuses.

Specialist tools may include HV phasing sticks, HV link sticks, HV live-line clamp operating sticks, HV ground transformer isolating handles and associated earths, HV overhead operating earths and HV detectors.

Switching program/schedule including necessary detail, eg. structure, switch or equipment number; locations; HV feeder; outage times; works plan/order.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and Sustainable Energy Procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention

- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and / or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be

required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Perform high voltage field switching to a given schedule as described in 7) and including:

A	All of the following:	Approvals/clearances Access permits
B	All of the following:	HV operating sticks HV operating earths HV detectors
C	At least one of the following:	HV phasing sticks HV ground mounted equipment isolating handles and earths.
D	At least two of the following:	HV links Air break switches Fuses
E	At least three of the following:	Reclosers Ring main units Circuit breakers Isolators Earth switches Sectionalisers
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in perform high voltage field switching to a given schedule.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.2, 1.8, 1.9, 1.11, 2.7, 3.1, 3.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1, 1.3, 3.1, 3.5, 3.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.4, 1.5, 1.6, 1.7, 1.10, 1.12, 2.1, 2.5, 2.6, 2.10, 3.1, 3.2, 3.3	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  2.3, 2.5, 2.6, 2.10, 3.4	3

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.1, 1.7, 2.2, 2.4, 2.6, 2.9	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.1, 2.4, 2.8, 2.9, 3.1	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.7, 2.2, 2.5, 2.6, 3.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: 1.1, 1.3, 1.5, 1.6, 1.7, 1.8, 1.11, 2.2, 3.1, 3.3
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.2, 1.4, 1.7, 1.10, 2.3, 2.5, 2.6, 2.7, 2.8, 2.9, 3.4
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.1, 2.5, 2.9, 2.10, 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.2, 1.3, 1.4, 1.7, 1.8, 1.10, 2.1, 2.2, 2.4, 2.7, 2.8, 2.9, 3.1, 3.6
5	Planning and organising the	Refer to the following Performance Criteria for examples of application:

	meaningful work task	1.1, 1.2, 1.3, 1.4, 1.10, 2.3, 2.4, 2.5, 2.6, 2.7, 3.1
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.7, 2.4, 2.5, 2.6, 2.7, 2.8,3.1, 3.2

## UEENEEG035A Diagnose and rectify faults in a.c. motor drive systems

### Unit Descriptor

1)

This unit covers diagnosing and rectifying faults in systems controlling starting, speed, torque, power output, efficient running and braking of a.c. motors. The unit encompasses safe working practices, interpreting technical data, applying knowledge of a.c. motors operating parameters to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH026A Provide solutions to polyphase electronic power control problems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1 Prepare to diagnose and rectify faults.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
	1.4	The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
	1.5	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
	1.6	Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.
2 Diagnose and rectify faults.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Logical diagnostic methods are applied to diagnose a.c. motor control system faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
  - 2.5 Suspected fault scenarios are tested as being the source of system problems.
  - 2.6 Causes of the faults are identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the control system.
  - 2.7 Faults in the control components of the system are rectified to raise a.c. motor control system to its operation standard.
  - 2.8 System is tested to verify that the system operates as intended and to specified requirements.
  - 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
  - 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
  - 2.11 Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in a.c. motor drive systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.33 Variable speed drives for a.c. motors
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults and control a.c. motor drive system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in a.c. motor drive systems as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the cause of system faults.

- C Identifying faults and competency needed to rectify them.
- D Rectifying faults in system controls.
- E Verifying that the system operates correctly.
- F Documenting fault rectification.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in a.c. motor drive systems

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4	2

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.8	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEG036A **Diagnose and rectify faults in d.c. motor drive systems**

### **Unit Descriptor**

1)

This unit covers diagnosing and rectifying faults in systems controlling starting, speed, torque, power output, efficient running and braking of d.c. motors. The unit encompasses safe working practices, interpreting technical data, applying knowledge of d.c motors operating parameters to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH026A Provide solutions to polyphase electronic power control problems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 5 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |   |  |  |
|---|---|--|--|
|   | 2.4   | Logical diagnostic methods are applied to diagnose a.c. motor control system faults employing measurements and estimations of system operating parameters referenced to system operational requirements.             |  |
|   | 2.5   | Suspected fault scenarios are tested as being the source of system problems.   |  |
|   | 2.6   | Causes of the faults are identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the control system.   |  |
|   | 2.7   | Faults in the control components of the system are rectified to raise a.c. motor control system to its operation standard.   |  |
|   | 2.8   | System is tested to verify that the system operates as intended and to specified requirements.   |  |
|   | 2.9   | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.   |  |
|   | 2.10  | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |  |
|   | 2.11  | Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |  |
| 3 | Complete and report fault diagnosis and rectification activities. | 3.1  | OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2  | Work site is made safe in accordance with established safety procedures.   |
|   |   | 3.3  | Rectification of faults is documented in accordance with established procedures.   |
|   |   | 3.4  | Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified. |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in d.c. motor drive systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.34 Variable speed drives for d.c. motors
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults in a d.c. motor control system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnosing and rectifying faults in d.c. motor drive systems as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the cause of system faults.

- C Identifying faults and competency needed to rectify them.
- D Rectifying faults in system controls.
- E Verifying that the system operates correctly.
- F Documenting fault rectification.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in d.c. motor drive systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4	2

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEG037A Diagnose and rectify faults in energy supply apparatus

### Unit Descriptor

1)

This unit covers diagnosing and rectifying faults in apparatus in energy supply and distribution systems. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply apparatus to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG015A Find and rectify faults in energy supply network equipment

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1 Prepare to diagnose and rectify faults	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
	1.4	The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel
	1.5	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
	1.6	Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.
2 Diagnose and rectify faults	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
	2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures

- 2.4 Logical diagnostic methods are applied to diagnose energy supply apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
- 2.5 Suspected fault scenarios are tested as being the source of system problems.
- 2.6 Cause of the faults are identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the control system.
- 2.7 Faults in the apparatus components are rectified to raise energy supply apparatus to its operation standard.
- 2.8 Apparatus is tested to verify that it operates as intended and to specified requirements
- 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
- 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 2.11 Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in energy supply apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.22.2 Electrical power systems operations

2.18.1 Occupational Health and Safety principles

2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults a control energy supply apparatus.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Diagnosing and rectifying faults in energy supply apparatus as described in 7) and including:
  - A Applying logical diagnostic methods.
  - B Using fault scenarios to test the cause of system faults.
  - C Identifying faults and competency needed to rectify them.
  - D Rectifying faults in system controls.
  - E Verifying that the system operates correctly.
  - F Documenting fault rectification.
  - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in energy supply apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEG038A **Diagnose and rectify faults in electrical energy distribution systems**

### **Unit Descriptor**

1)

This unit covers diagnosing and rectifying faults in networks supplying electrical energy to consumers. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply and reticulation systems to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG015A Find and rectify faults in energy supply network equipment

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to diagnose and rectify faults

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures

- |   |  |  |
|---|--|--|
|   | 2.4  | Logical diagnostic methods are applied to diagnose energy supply apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements.               |
|   | 2.5  | Suspected fault scenarios are tested as being the source of system problems.   |
|   | 2.6  | Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is outside the scope of the control system.  |
|   | 2.7  | Faults in the apparatus components are rectified to raise energy supply apparatus to its operation standard.   |
|   | 2.8  | System is tested to verify that it operates as intended and to specified requirements  |
|   | 2.9  | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.   |
|   | 2.10   | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |
|   | 2.11   | Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Complete and report fault diagnosis and rectification activities | 3.1 OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2 Work site is made safe in accordance with established safety procedures.   |
|   |  | 3.3 Rectification of faults is documented in accordance with established procedures.   |
|   |  | 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in electrical energy distribution systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.22.6	Electrical power distribution systems
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.8.2	Occupational Health and Safety, enterprise and responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults in electrical energy reticulation system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnosing and rectifying faults in electrical energy distribution systems as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the cause of system faults.
    - C Identifying faults and competency needed to rectify them.
    - D Rectifying faults in system controls.
    - E Verifying that the system operates correctly.
    - F Documenting fault rectification.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in electrical energy distribution systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

**UEENEEG015A** Find and rectify faults in energy supply network equipment

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10
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## UEENEEG039A Diagnose and rectify faults in distributed generation systems

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers diagnosing and rectifying faults in distributed generation systems. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply and reticulation systems to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEG015A Find and rectify faults in energy supply network equipment</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0"> <tr> <td>Reading</td> <td>5</td> <td>Writing</td> <td>5</td> <td>Numeracy</td> <td>5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p> <p>Note:</p>						

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to diagnose and rectify faults</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.</p> <p>1.4 The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel</p> <p>1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site</p> <p>1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.</p>
<p>2 Diagnose and rectify faults</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures</p> <p>2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures</p>

- 2.4 Logical diagnostic methods are applied to diagnose distributed generation system faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
- 2.5 Suspected fault scenarios are tested as being the source of system problems.
- 2.6 Causes of the faults are identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the control system.
- 2.7 Faults in the system components are rectified to raise distributed generation system to its operation standard.
- 2.8 System is tested to verify that it operates as intended and to specified requirements
- 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
- 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 2.11 Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in distributed generation systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.22.4 Distributive generation systems
- 2.18.1 Occupational Health and Safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise and responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults in distributed generation systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Diagnose and rectify faults in distributed generation systems as described in 7) and including:
  - A Applying logical diagnostic methods.
  - B Using fault scenarios to test the cause of system faults.
  - C Identifying faults and competency needed to rectify them.
  - D Rectifying faults in system controls.
  - E Verifying that the system operates correctly.
  - F Documenting fault rectification.
  - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in distributed generation systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4	2

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEG040A    **Develop engineering solutions for energy supply power transformer problems**

### **Unit Descriptor**

1)

This unit covers developing engineering solutions to resolve problems with energy supply system protection. It encompasses working safely, apply extensive knowledge of energy supply power transformer operation and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical transformer problems are those encountered in meeting performance requirements and compliance standards, revising a transformer operating parameters and dealing with transformer malfunctions

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been acquired:

UEENEEG038A    Diagnose and rectify faults in electrical energy supply distribution system

OR

UEENEEG039A    Diagnose and rectify faults in distributed generation systems

OR

UEENEEG042A    Diagnose and rectify faults in electrical energy supply transmission system

AND

UEENEEG049A    Solve problems in complex polyphase power circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading        5        Writing        5        Numeracy        5

**Application of the Unit 3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to develop engineering solution for energy supply power transformer problems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The extent of the transformer problem is determined from performance specifications and situation reports and in consultations with relevant persons.

- |   |   |     |  |
|---|---|-----|--|
|   |   | 1.4 | Activities are planned to meet scheduled timelines in consultation with others involved in the work.   |
|   |   | 1.5 | Effective strategies are formed to ensure solution development and implementation is carried out efficiently.  |
| 2 | Develop engineering solutions for energy supply power transformer problems.                     | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.   |
|   |   | 2.2 | Knowledge of supply power transformer arrangements, operation, device characteristics and applications are applied to developing solutions to supply power transformer problems.                                 |
|   |   | 2.3 | Parameters, specifications and performance requirements in relation to each transformer problem are obtained in accordance with established procedures.  |
|   |   | 2.4 | Approaches to resolving supply power transformer problems are analysed to provide most effective solutions.  |
|   |   | 2.5 | Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.  |
|   |   | 2.6 | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.   |
| 3 | Test, document and implement engineering solution for energy supply power transformer problems. | 3.1 | Solutions to transformer problems are tested to determine their effectiveness and modified where necessary.  |
|   |   | 3.2 | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.   |
|   |   | 3.3 | Appropriately competent and qualified person(s) required to implement solutions to supply power transformer problems are coordinated in accordance with regulatory requirements and enterprise policy.<br>(Note) |
|   |   | 3.4 | Justification for solutions used to solve supply power transformer problems is documented for inclusion in work/project development records in accordance with professional standards.                           |

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing engineering solutions for energy supply power transformer problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.8.3 Power transformer diagnostic

2.18.1 Occupational Health and Safety principles

2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four supply power transformer problems.

Note.

Typical transformer problems are those encountered in meeting performance requirements and compliance standards, revising a transformer operating parameters and dealing with transformer malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the

workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop engineering solutions for energy supply power transformer problems as described in 7) and including:
    - A Understanding the extent of the transformer problems.
    - B Forming effective strategies for solution development and implementation.
    - C Obtaining transformer parameters, specifications and performance requirements appropriate to each problem.
    - D Testing and solutions to transformer problems.
    - E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
    - F Documenting justification of solutions implemented in accordance with professional standards.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing engineering solutions for energy supply power transformer problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG038A Diagnose and rectify faults in electrical energy supply distribution system

OR

UEENEEG039A Diagnose and rectify faults in distributed generation systems

OR

UEENEEG042A Diagnose and rectify faults in electrical energy supply transmission system

AND

UEENEEG049A Solve problems in complex polyphase power circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEG041A **Diagnose and rectify faults in servo drive systems**

### **Unit Descriptor**

1)

This unit covers diagnosing and rectifying faults in systems controlling servo and drives. The unit encompasses safe working practices, interpreting technical data, applying knowledge of servo/stepper drives operating parameters to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been acquired:

UEENEEH026A Provide solutions to polyphase electronic power control problems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 5 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to diagnose and rectify faults.</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.</p> <p>1.4 The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel.</p> <p>1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.</p>
<p>2 Diagnose and rectify faults.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p>

- 2.4 Logical diagnostic methods are applied to diagnose servo/stepper drive control system faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
  - 2.5 Suspected fault scenarios are tested as being the source of system problems.
  - 2.6 Causes of the faults are identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the control system.
  - 2.7 Faults in the control components of the system are rectified to raise servo drive control system to its operation standard.
  - 2.8 System is tested to verify that the system operates as intended and to specified requirements.
  - 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
  - 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
  - 2.11 Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in servo drive systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.35 Servomechanism systems
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults in a servo/stepper drive control system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in servo drive systems as described in 7) and including:
    - A Applying logical diagnostic methods.

- B Using fault scenarios to test the source of system faults.
- C Identifying faults and competency needed to rectify them.
- D Rectifying faults in system controls.
- E Verifying that the system operates correctly.
- F Documenting fault rectification.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in servo drive systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4	2

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEG042A Diagnose and rectify faults in electrical energy supply transmission systems

### Unit Descriptor

1)

This unit covers diagnosing and rectifying faults in electrical energy transmission systems. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply and transmission systems to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG015A Find and rectify faults in energy supply system

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element.  
Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- |   |   |  |  |
|---|---|--|--|
|   | 2.3   | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |  |
|   | 2.4   | Logical diagnostic methods are applied to diagnose electrical energy transmission system faults employing measurements and estimations of system operating parameters referenced to system operational requirements. |  |
|   | 2.5   | Suspected fault scenarios are tested as being the source of system problems.   |  |
|   | 2.6   | Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the control system.   |  |
|   | 2.7   | Faults in the system components are rectified to raise electrical energy transmission system to its operation standard.  |  |
|   | 2.8   | System is tested to verify that it operates as intended and to specified requirements.   |  |
|   | 2.9   | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.   |  |
|   | 2.10  | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |  |
|   | 2.11  | Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to system and the surrounding environment or services and using sustainable energy practices.    |  |
| 3 | Complete and report fault diagnosis and rectification activities. | 3.1  | OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2  | Work site is made safe in accordance with established safety procedures.   |
|   |   | 3.3  | Rectification of faults is documented in accordance with established procedures.   |
|   |   | 3.4  | Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in electrical energy supply transmission systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.22.3 Electrical power system transmission faults

2.18.1 Occupational Health and Safety principles

2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults in a servo/stepper drive control system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Diagnose and rectify faults in electrical energy supply transmission systems as described in 7) and including:
  - A Applying logical diagnostic methods.
  - B Using fault scenarios to test the source of system faults.
  - C Identifying faults and competency needed to rectify them.
  - D Rectifying faults in system.
  - E Verifying that the system operates correctly.
  - F Documenting fault rectification.
  - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in electrical energy supply transmission systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.8; 3.2; 3.3

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEG043A **Develop engineering solution for synchronous machine problems**

### **Unit Descriptor**

**1)**

This unit covers developing engineering solutions to resolve problems with synchronous machines. It encompasses working safely, apply extensive knowledge of synchronous machine operation, construction and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical machine problems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG049A    Solve problems in complex polyphase power circuits

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations

directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to develop engineering solution for synchronous machine problems.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 The extent of the machine problem is determined from performance specifications and situation reports and in consultations with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.</p>
<p>2 Develop engineering solution for synchronous machine problems.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of synchronous machine construction, operation, characteristics and applications are applied to developing solutions to synchronous machine problems.</p> <p>2.3 Parameters, specifications and performance requirements in relation to each machine problem are obtained in accordance with established procedures.</p>

- |   |  |   |
|---|--|---|
|   | 2.4  | Approaches to resolving synchronous machine problems are analysed to provide most effective solutions.  |
|   | 2.5  | Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.   |
|   | 2.6  | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.  |
| 3 | Test, document and implement engineering solution for synchronous machine problem. |   |
|   | 3.1  | Solutions to machine problems are tested to determine their effectiveness and modified where necessary.   |
|   | 3.2  | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.  |
|   | 3.3  | Appropriately competent and qualified person(s) required to implement solutions to synchronous machine problems are coordinated in accordance with regulatory requirements and enterprise policy.<br>(Note) |
|   | 3.4  | Justification for solutions used to solve synchronous machine problems is documented for inclusion in work/project development records in accordance with professional standards.                           |

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing engineering solution for synchronous machine problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.6.36 | Synchronous machine diagnostics           |
| 2.18.1 | Occupational Health and Safety principles |
| 2.18.2 | Electrical Safe working practices         |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four synchronous machine problems.

Note.

Typical machine problems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to

consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop engineering solution for synchronous machine problems as described in 7) and including:
    - A Understanding the extent of the machine problem.
    - B Forming effective strategies for solution development and implementation.
    - C Obtaining machine parameters, specifications and performance requirements appropriate to each problem.
    - D Testing and solutions to machine problems.

- E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
- F Documenting justification of solutions implemented in accordance with professional standards.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing engineering solution for synchronous machine problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG049A Solve problems in complex polyphase power circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 3.3	3

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.5

## UEENEEG044A **Develop engineering solutions for d.c. machine problems**

### **Unit Descriptor**

1)

This unit covers developing engineering solutions to resolve problems with d.c. machines. It encompasses working safely, apply extensive knowledge of d.c machine operation and construction and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical machine problems are those encountered in meeting performance requirements and compliance standards, revising machine operating parameters and dealing with machine malfunctions.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG048A Solve problems in complex multiple path power circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to develop engineering solution for d.c. machine problems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The extent of the machine problem is determined from performance specifications and situation reports and in consultations with relevant persons.
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.

2 Develop engineering solution for d.c. machine problems.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of d.c machine construction, operation, characteristics and applications are applied to developing solutions to d.c machine problems.
- 2.3 Parameters, specifications and performance requirements in relation to each machine problem are obtained in accordance with established procedures.
- 2.4 Approaches to resolving d.c. machine problems are analysed to provide most effective solutions.

	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.	
	2.6	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.	
3	Test, document and implement engineering solution for d.c. machine problems.	3.1	Solutions to machine problems are tested to determine their effectiveness and modified where necessary.
		3.2	Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.
		3.3	Appropriately competent and qualified person(s) required to implement solutions to d.c machine problems are coordinated in accordance with regulatory requirements and enterprise policy. (Note)
		3.4	Justification for solutions used to solve d.c. machine problems is documented for inclusion in work/project development records in accordance with professional standards.

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing engineering solutions for d.c. machine problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.38	Direct current machine diagnostics
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four d.c. machine problems.

Note.

Typical machine problems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop engineering solutions for d.c. machine problems as described in 7) and including:
    - A Understanding the extent of the machine problem.
    - B Forming effective strategies for solution development and implementation.
    - C Obtaining machine parameters, specifications and performance requirements appropriate to each problem.
    - D Testing and solutions to machine problems.
    - E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
    - F Documenting justification of solutions implemented in accordance with professional standards.

- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing engineering solutions for d.c. machine problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG048A Solve problems in complex multiple path power circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the

following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3 to 2.4; 3.1	3

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEG045A    **Develop engineering solutions for induction motor problems**

### **Unit Descriptor**

**1)**

This unit covers developing engineering solutions to resolve problems with induction motors. It encompasses working safely, apply extensive knowledge of induction motor operation and construction and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical motor problems are those encountered in meeting performance requirements and compliance standards, revising a motor operating parameters and dealing with motor malfunctions.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG049A    Solve problems in complex polyphase power circuits

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to develop engineering solution for induction motor problems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The extent of the motor problem is determined from performance specifications and situation reports and in consultations with relevant persons.
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.

2 Develop engineering solution for induction motor problems.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of induction motor construction, operation, characteristics and applications are applied to developing solutions to induction motor problems.
- 2.3 Parameters, specifications and performance requirements in relation to each motor problem are obtained in accordance with established procedures.
- 2.4 Approaches to resolving induction motor problems are analysed to provide most effective solutions.

- |   |   |   |
|---|---|---|
|   | 2.5   | Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.   |
|   | 2.6   | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.  |
| 3 | Test, document and implement engineering solution for induction motor problems. |   |
|   | 3.1   | Solutions to motor problems are tested to determine their effectiveness and modified where necessary.   |
|   | 3.2   | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.  |
|   | 3.3   | Appropriately competent and qualified person(s) required to implement solutions to induction motor problems are coordinated in accordance with regulatory requirements and enterprise policy.<br>(Note) |
|   | 3.4   | Justification for solutions used to solve induction motor problems is documented for inclusion in work/project development records in accordance with professional standards.                           |

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing engineering solutions for energy supply system protection problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.6.37 | Induction motors diagnostics              |
| 2.18.1 | Occupational Health and Safety principles |
| 2.18.2 | Electrical Safe working practices         |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four supply system protection problems.

Note.

Typical motor problems are those encountered in meeting performance requirements and compliance standards, revising a motor operating parameters and dealing with motor malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will

contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop engineering solutions for energy supply system protection problems as described in 7) and including:
    - A Understanding the extent of the motor problem.
    - B Forming effective strategies for solution development and implementation.
    - C Obtaining motor parameters, specifications and performance requirements appropriate to each problem.
    - D Testing and solutions to motor problems

- E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
- F Documenting justification of solutions implemented in accordance with professional standards.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing engineering solutions for energy supply system protection problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG049A Solve problems in complex polyphase power circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 3.3	3

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3 to 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.3 to 1.5; 3.1 to 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEG046A **Develop engineering solutions for energy supply system protection problems**

### Unit Descriptor

1)

This unit covers developing engineering solutions to resolve problems with energy supply system protection. It encompasses working safely, apply extensive knowledge of energy supply system protection operation, protection devices and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical protection problems are those encountered in meeting performance requirements and compliance standards, revising a protection operating parameters and dealing with protection malfunctions..

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG038A Diagnose and rectify faults in electrical energy supply distribution system

OR

UEENEEG039A Diagnose and rectify faults in distributed generation systems

OR

UEENEEG042A Diagnose and rectify faults in electrical energy supply transmission system

AND

UEENEEG049A Solve problems in complex polyphase power circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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**Application of the Unit 3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to develop engineering solution for energy supply system protection problems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The extent of the protection problem is determined from performance specifications and situation reports and in consultations with relevant persons.

- |   |   |   |
|---|---|---|
|   | 1.4   | Activities are planned to meet scheduled timelines in consultation with others involved in the work.  |
|   | 1.5   | Effective strategies are formed to ensure solution development and implementation is carried out efficiently.   |
| 2 | Develop engineering solution for energy supply system protection.                               | <p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of supply system protection arrangements, operation, device characteristics and applications are applied to developing solutions to supply system protection problems.</p> <p>2.3 Parameters, specifications and performance requirements in relation to each protection problem are obtained in accordance with established procedures.</p> <p>2.4 Approaches to resolving supply system protection problems are analysed to provide most effective solutions.</p> <p>2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.</p> <p>2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.</p> |
| 3 | Test, document and implement engineering solution for energy supply system protection problems. | <p>3.1 Solutions to protection problems are tested to determine their effectiveness and modified where necessary.</p> <p>3.2 Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.</p> <p>3.3 Appropriately competent and qualified person(s) required to implement solutions to supply system protection problems are coordinated in accordance with regulatory requirements and enterprise policy. (Note)</p> <p>3.4 Justification for solutions used to solve supply system protection problems is documented for inclusion in work/project development records in accordance with professional standards.</p>  |

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing engineering solutions for energy supply system protection problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.22.5 Electrical power system protection diagnostic

2.18.1 Occupational Health and Safety principles

2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four supply system protection problems.

Note.

Typical protection problems are those encountered in meeting performance requirements and compliance standards, revising a protection operating parameters and dealing with protection malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the

workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop engineering solutions for energy supply system protection problems as described in 7) and including:
    - A Understanding the extent of the protection problem.
    - B Forming effective strategies for solution development and implementation.
    - C Obtaining protection parameters, specifications and performance requirements appropriate to each problem.
    - D Testing and solutions to protection problems.
    - E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
    - F Documenting justification of solutions implemented in accordance with professional standards.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing engineering solutions for energy supply system protection problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent  
assessment and  
relationship  
with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG038A Diagnose and rectify faults in electrical energy supply distribution system

OR

UEENEEG039A Diagnose and rectify faults in distributed generation systems

OR

UEENEEG042A Diagnose and rectify faults in electrical energy supply transmission system

OR

UEENEEG049A Solve problems in complex polyphase power circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3 to 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEG047A Provide computational solutions to power engineering problems

### Unit Descriptor

1)

This unit covers the application of computational processes to solving problems encountered in power engineering. It encompasses working safely, applying problem solving techniques, using a range of mathematical processes, providing solutions to power engineering problems and justifying such solutions.

Note.

Typical engineering problems are those encountered in meeting requirements in a design brief, meeting performance requirements and compliance standards, revising a systems operating parameters and dealing with system malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG002A Solve problems in single and three phase low voltage circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>	
<p>1 Provide computational solutions to engineering problems</p>	<p>1.1</p>	<p>OHS procedures for a given work area are obtained and understood</p>
	<p>1.2</p>	<p>The nature of the problems are obtained from documentation or from work supervisor to establish the scope of work to be undertaken</p>
	<p>1.3</p>	<p>Power engineering problems are clearly stated in writing and/or diagrammatic form to ensure they are understood and appropriate methods used to resolve them.</p>
	<p>1.4</p>	<p>Known constants and variable related to the problem are obtained from measured values or problem documentation.</p>
	<p>1.5</p>	<p>Alternative methods for resolving the problem are considered and where necessary discussed with appropriate person(s).</p>
	<p>1.6</p>	<p>Problems are solved using appropriate mathematical processes and within the realistic accuracy.</p>
<p>2 Complete work and document problem solving activities</p>	<p>2.1</p>	<p>Justification for solutions used to solve engineering problems is documented for inclusion in work/project development records in accordance with professional standards.</p>
	<p>2.2</p>	<p>Work completion is documented and an appropriate person or persons notified.</p>

**REQUIRED SKILLS AND KNOWLEDGE**

**6)** This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing computational solutions to power engineering problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.11 Power engineering computations

## 2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to problems that apply to power engineering diagnosis and development work functions in any of the following disciplines:

- Electrical
- Electronics
- Renewable energy
- Control

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be

‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide computational solutions to power engineering problems as described in 7) and including:
    - A Clearly stating problems in written and diagrammatic form.
    - B Obtaining known constants and variable from an appropriate source.

- C Solving problems using appropriate mathematical processes.
- D Documenting justification of solutions provided in accordance with professional standards.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing computational solutions to power engineering problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG002A Solve problems in single and three phase low voltage circuits

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.1; 2.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.2; 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEG048A Solve problems in complex multiple path power circuits

### Unit Descriptor

1)

This unit covers the determining correct operation of complex series-parallel power circuits and providing solutions as they apply to electrical power engineering work functions. It encompasses working safely, problem solving procedures, including electrical measuring devices, applying appropriate circuit theorems and providing solutions derive from measurements and calculations and providing justification for such solutions.

Note.

Typical engineering problems are those encountered in meeting requirements in a design brief, meeting performance requirements and compliance standards, revising a systems operating parameters and dealing with system malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG047A Provide computational solutions to power engineering problems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Provide computational solutions to engineering problems

1.1 OHS procedures for a given work area are obtained and understood

1.2 The nature of the problems are obtained from documentation or from work supervisor to establish the scope of work to be undertaken

1.3 Power engineering problems are clearly stated in writing and/or diagrammatic form to ensure they are understood and appropriate methods used to resolve them.

1.4 Known constants and variable related to the problem are obtained from measured values or problem documentation.

1.5 Alternative methods for resolving the problem are considered and where necessary discussed with appropriate person(s).

1.6 Problems are solved using appropriate mathematical processes and within the realistic accuracy.

2 Complete work and document problem solving activities

2.1 Justification for solutions used to solve engineering problems is documented for inclusion in work/project development records in accordance with professional standards.

2.2 Work completion is documented and an appropriate person or persons notified.

**REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in complex multiple path power circuits. The extent of the essential knowledge and skills required is given Volume 2 Part 2, Section 2 Clauses:

2.8.9.2 Electrical power circuit analysis

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to problems that apply to power engineering diagnosis and development work functions in any of the following disciplines:.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in complex multiple path power circuits as described in 7) and including:
    - A Clearly stating problems in written and diagrammatic form.
    - B Obtaining known constants and variable from an appropriate source.
    - C Solving problems using appropriate mathematical processes.
    - D Documenting justification of solutions provided in accordance with professional standards.

**Context of and specific resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice

**assessment**

using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in complex multiple path power circuits..

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG002A Solve problems in single and three phase low voltage circuits

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.3 to 1.6	3

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.1; 2.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.2; 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEG049A Solve problems in complex polyphase power circuits

### Unit Descriptor

1)

This unit covers determining correct operation of complex polyphase power circuits and providing solutions as they apply to electrical power engineering work functions. It encompasses working safely, problem solving procedures, including using electrical measuring devices, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG048A Solve problems in complex multiple path power circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to solve problems in complex polyphase power circuits.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve problems in complex polyphase power circuits.

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Established methods are used to solving circuit problems from measure and calculated values as they apply to complex multiple path circuit.
- 2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.

	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in complex polyphase power circuits. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.8.9.3	Polyphase power circuit analysis
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to complex polyphase power circuits as they apply to problems related to electrical power engineering diagnosis and development work functions in any of the following types of circuit problems:

- Determining the operating parameters of an existing circuit
- Alternating an existing circuit to comply with specified operating parameters
- Developing circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in complex polyphase power circuits as described in 7) and including:
    - A Determining the operating parameters of existing circuit.
    - B Using established problem solving methods.
    - C Taking relevant measurements accurately.
    - D Interpreting measured values appropriately.
    - E Providing effective solutions to circuit problems from measurements and calculations.
    - F Giving written justification of solutions provided.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in complex polyphase power circuits..

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEG050A Wind coils

### Unit Descriptor

1)

This unit covers setting up coil former and winding machines and winding coils for static and rotating machines. It encompasses working safely, using hand and powered tools, measuring, applying basic knowledge of electrical circuits, following technical instructions and set procedures and recording work activities.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE007A Use drawings, diagrams, schedules and service manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Electrical

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to wind coils.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures for work preparation are followed.</p> <p>1.3 Work instructions are identified, obtained and understood.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Materials required for the work are obtained in accordance with established routines and procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Wind coils.	<p>2.1 Established OHS risk control work measures are followed.</p> <p>2.2 Winding machines are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.3 Winding wire and insulation is selected in accordance with work instructions and established routines.</p> <p>2.4 Winding formers and machine is set-up in accordance with routine instructions.</p> <p>2.5 Prescribed solutions are used to resolve work completion issues.</p> <p>2.6 Routine quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape.</p> <p>2.7 Work is completed in acceptable timeframe given environment and workplace conditions.</p>
3 Complete work report.	3.1 OHS measures work completion risk control are followed.

- 3.2 Work report forms/data sheets are completed accurately.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and winding coils.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.29 Coil winding basics  
2.6.30 Coil Testing  
2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to winding at least four different types of coils in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Winding coils as described as described in 7) and including:
    - A Following winding specifications.
    - B Selecting correct winding wire and insulation.
    - C Setting up and operating winding machine.
    - D Adhering to quality procedures.
    - E Completing work report/forms accurately.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in winding coils.

**Method of assessment****8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies****8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.3; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 3.1
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.5

## UEENEEG051A Place and connect coils

### Unit Descriptor

1)

This unit covers insulating, placing and connecting coils, in a small armatures/stators, transformers and solenoid equipped devices. The unit encompasses working safely, using hand and powered tools, measuring, applying basic knowledge of electrical circuits, connecting conductors following technical instructions and set procedures and recording work activities.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE004A Solve problems in multiple path d.c. circuits

UEENEEG050A Wind coils

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

<b>Competency Field</b>	<b>4)</b>
	Electrical
<b>5) Elements describe the essential outcomes of a unit of competency</b>	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to place and connect coils.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures for work preparation are followed.</p> <p>1.3 Work instructions are identified, obtained and understood.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Materials required for the work are obtained in accordance with established routines and procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Place and connect coils.	<p>2.1 Established OHS risk control work measures are followed.</p> <p>2.2 Machines/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.3 Coils and insulation are selected in accordance with work instructions and established routines.</p> <p>2.4 Insulation is cut and applied in accordance with work instructions and established routines.</p> <p>2.5 Coils are place in accordance with work instructions and established routines.</p> <p>2.6 Coils ends are prepared and connections made in accordance with work instructions and established routines.</p> <p>2.7 Prescribed solutions are used to resolve work completion issues.</p>

- |   |                       |  |   |
|---|-----------------------|--|---|
|   | 2.8                   | Routine quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape. |   |
|   | 2.9                   | Work is completed in acceptable timeframe given environment and workplace conditions.                                  |   |
| 3 | Complete work report. | 3.1  | OHS measures work completion risk control are followed. |
|   |                       | 3.2  | Work report forms/data sheets are completed accurately. |

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and placing and connecting coils.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |   |
|--|----------|---|
|  | 2.1.9    | Winding wire types and connections        |
|  | 2.6.31.1 | Electrical machine winding basic          |
|  | 2.18.1   | Occupational Health and Safety principles |

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to placing and connecting coils for a small armatures/stators and single phase transformers or solenoid equipped devices in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range

Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Place and connect coils as described as described in 7) and including:
    - A Following winding specifications.
    - B Selecting correct coils and insulation.
    - C Cutting insulation and place insulation and coils without damage.
    - D Connecting coils correctly.
    - E Adhering to quality procedures.
    - F Completing work report/forms accurately.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace

and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in placing and connecting coils.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4, 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7
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## UEENEEG052A Rewind single phase induction machines

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers dismantling and winding stators for single-phase induction machines. It encompasses working safely, using hand and powered tools, measuring, applying basic knowledge of electrical circuits and winding data, following technical instructions, and set procedures and recording work activities.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEG051A Place and connect coils</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0"> <tr> <td>Reading</td> <td>3</td> <td>Writing</td> <td>3</td> <td>Numeracy</td> <td>3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Electrical</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to rewind single phase induction machines.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures for work preparation are followed.</p> <p>1.3 Work instructions are identified, obtained and understood.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Induction machine is dismantled and parts tagged and stored to prevent loss or damage.</p> <p>1.6 Winding data is obtained from record or from work supervisor in accordance with established routines.</p> <p>1.7 Winding is stripped from stator in accordance with established routines.</p> <p>1.8 Materials required for the work are obtained in accordance with established routines and procedures.</p> <p>1.9 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Rewind single phase induction machines.	<p>2.1 Established OHS risk control work measures are followed.</p> <p>2.2 Machines/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.3 Induction machine is dismantled and parts tagged and stored to prevent loss or damage.</p> <p>2.4 Winding is stripped from stator in accordance with established routines.</p> <p>2.5 Stator is wound and insulated in accordance with winding data and established routines.</p>

- 2.6 Machine is assembled and prepares for testing.
- 2.7 Prescribed solutions are used to resolve work completion issues.
- 2.8 Routine quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape.
- 2.9 Work is completed in acceptable timeframe given environment and workplace conditions.
- 3 Complete work report.
  - 3.1 OHS measures work completion risk control is followed.
  - 3.2 Work report forms/data sheets are completed accurately in accordance with established routines.

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and rewinding single phase induction machines. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.3.2 Control circuit fundamentals
- 2.6.6.2 Alternating current rotating machines
- 2.6.31.1 Electrical machine winding basic
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to dismantling and winding stators for single-phase induction machines in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

**8)** This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## **Critical aspects of evidence required to**

### **8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Rewind single phase induction machines as described as described in 7) and including:
    - A Dismantling machine and storing parts securely.
    - B Preparing stator for winding.
    - C Following winding specifications.
    - D Selecting correct coils and insulation.
    - E Winding and connecting stator correctly.
    - F Assembling machine and preparing for testing.
    - G Adhering to quality procedures.
    - H Completing work report/forms accurately.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in rewinding single phase induction machines.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:

		All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 1.4, 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.7

## **UEENEEG053A      Rewind three phase induction machines rated for low voltage**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers preparing, placing and connecting coils and insulating three phase stators and rotors. It encompasses working safely, using hand and powered tools, measuring, applying knowledge of electrical circuits and stator windings, using testing devices, applying technical and quality standards and keeping winding records.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEG052A      Rewind single phase induction machines</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Electrical</p>						

### **ELEMENT**

### **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to rewind three phase induction machines.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures for work preparation are followed.</p> <p>1.3 The extent of the work is determined from job sheets, specifications and regulatory requirements.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Induction machine is dismantled and parts tagged and stored to prevent loss or damage.</p> <p>1.6 Winding data is obtained from winding data records or directly from measurements of stator and recorded in accordance with established procedures.</p> <p>1.7 Winding is stripped from stator in accordance with established procedures.</p> <p>1.8 Materials required for the work are obtained in accordance with established procedures and procedures.</p> <p>1.9 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Rewind three phase induction machines.	<p>2.1 Established OHS risk control work measures are followed.</p> <p>2.2 Machines/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.3 Induction machine is dismantled and parts tagged and stored to prevent loss or damage.</p> <p>2.4 Winding is stripped from stator in accordance with established procedures.</p> <p>2.5 Stator is wound and insulated in accordance with winding data and established procedures.</p> <p>2.6 Machine is assembled and prepares for final testing in accordance with established procedures.</p>

- 2.7 Prescribed solutions are used to resolve work completion issues.
- 2.8 Routine quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape.
- 2.9 Work is completed in acceptable timeframe given environment and workplace conditions.
- 3 Complete work report.
  - 3.1 OHS measures work completion risk control is followed.
  - 3.2 Work report forms/data sheets are completed accurately in accordance with established procedures.

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and rewinding three phase induction machines rated for low voltage. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.8.2 Single & three-phase transformers
- 2.6.28 Motor windings
- 2.6.31.2 Low voltage three phase motor winding techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to dismantling and winding stators for at least three different three-phase induction machines in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Rewind three phase induction machines rated for low voltage as described as described in 7) and including:
    - A Dismantling machine and storing parts securely.
    - B Preparing stator for winding.
    - C Following winding specifications.
    - D Selecting correct coils and insulation.
    - E Winding and connecting stator correctly.
    - F Assembling machine and preparing for testing.
    - G Adhering to quality procedures.
    - H Completing work report/forms accurately.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in rewinding three phase induction machines rated for low voltage.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG057A Conduct electrical tests on low voltage electrical machines

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 1.4, 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7
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## UEENEEG054A **Rewind direct current machines rated for low voltage**

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers preparing, placing and connecting coils and insulating direct current motor armatures and poles. It encompasses working safely, using hand and powered tools, measuring, applying knowledge of electrical circuits and stator windings, using testing devices, applying technical and quality standards and keeping winding records.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEG052A    Rewind single phase induction machines</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Electrical</p>						

### ELEMENT

### PERFORMANCE CRITERIA

<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>	
<p>1 Prepare to rewind direct current machines.</p>	<p>1.1</p> <p>1.2</p> <p>1.3</p> <p>1.4</p> <p>1.5</p> <p>1.6</p> <p>1.7</p> <p>1.8</p> <p>1.9</p>	<p>OHS procedures for a given work area are identified, obtained and understood.</p> <p>Established OHS risk control measures for work preparation are followed.</p> <p>The extent of the work is determined from job sheets, specifications and regulatory requirements.</p> <p>Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>Induction machine is dismantled and parts tagged and stored to prevent loss or damage.</p> <p>Winding data is obtained from winding data records or directly from measurements of stator and recorded in accordance with established procedures.</p> <p>Winding is stripped from stator in accordance with established procedures.</p> <p>Materials required for the work are obtained in accordance with established procedures and procedures.</p> <p>Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
<p>2 Rewind direct current machines.</p>	<p>2.1</p> <p>2.2</p> <p>2.3</p> <p>2.4</p> <p>2.5</p> <p>2.6</p>	<p>Established OHS risk control work measures are followed.</p> <p>Machines/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>Induction machine is dismantled and parts tagged and stored to prevent loss or damage.</p> <p>Winding is stripped from stator in accordance with established procedures.</p> <p>Armature and fields are wound and insulated in accordance with winding data and established procedures.</p> <p>Machine is assembled and prepares for final testing in accordance with established procedures.</p>

- |   |                       |  |
|---|-----------------------|--|
|   | 2.7                   | Prescribed solutions are used to resolve work completion issues.   |
|   | 2.8                   | Routine quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape. |
|   | 2.9                   | Work is completed in acceptable timeframe given environment and workplace conditions.                                  |
| 3 | Complete work report. | 3.1 OHS measures work completion risk control is followed.   |
|   |                       | 3.2 Work report forms/data sheets are completed accurately in accordance with established procedures.                  |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and rewinding direct current machines rated for low voltage. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.6.28   | Motor windings                            |
| 2.6.31.3 | Direct current motor winding techniques   |
| 2.18.1   | Occupational Health and Safety principles |
| 2.18.2   | Electrical Safe working practices         |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to dismantling and winding armatures and field coils for at least three different direct current machines in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Rewind direct current machines rated for low voltage as described as described in 7) and including:
    - A Dismantling machine and storing parts securely.
    - B Preparing stator for winding.
    - C Following winding specifications.
    - D Selecting correct coils and insulation.
    - E Winding and connecting armature and fields correctly.
    - F Assembling machine and preparing for testing.
    - G Adhering to quality procedures.
    - H Completing work report/forms accurately.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in rewinding direct current machines rated for low voltage.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG057A Conduct electrical tests on low voltage electrical machines

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4, 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEEG055A      Rewind three phase induction machines rated for high voltage to 3.3 kV**

**Unit Descriptor**                    1)

This unit covers preparing, placing and connecting coils and insulating three phase stators and rotors rated for high voltage to 3.3 kV. It encompasses working safely, using hand and powered tools, measuring, applying knowledge of electrical circuits and HV stator windings, applying technical and quality standards and keeping winding records.

**Prerequisite Unit(s)**            2)

**Competencies**                    2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG053A      Rewind three phase induction machines rated for low voltage

**Literacy and numeracy skills**            2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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**Application of the Unit**                                    3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

**Licence to practise**                    3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships

**Competency Field**                    4)

Electrical

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to rewind three phase induction machines.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures for work preparation are followed.</p> <p>1.3 The extent of the work is determined from job sheets, specifications and regulatory requirements.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Induction machine is dismantled and parts tagged and stored to prevent loss or damage.</p> <p>1.6 Winding data is obtained from winding data records or directly from measurements of stator and recorded in accordance with established procedures.</p> <p>1.7 Winding is stripped from stator in accordance with established procedures.</p> <p>1.8 Materials required for the work are obtained in accordance with established procedures and procedures.</p> <p>1.9 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Rewind three phase induction machines.	<p>2.1 Established OHS risk control work measures are followed.</p> <p>2.2 Machines/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures. (see Note 1).</p> <p>2.3 Induction machine is dismantled and parts tagged and stored to prevent loss or damage.</p> <p>2.4 Winding is stripped from stator in accordance with established procedures.</p> <p>2.5 Stator is wound and insulated to 3.3 kV standards in accordance with winding data and established procedures.</p>

- 2.6 Machine is assembled and prepares for final testing in accordance with established procedures.
- 2.7 Prescribed solutions are used to resolve work completion issues.
- 2.8 Routine quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape.
- 2.9 Work is completed in acceptable timeframe given environment and workplace conditions.
- 3 Complete work report.
  - 3.1 OHS measures work completion risk controls are followed.
  - 3.2 Work report forms/data sheets are completed accurately in accordance with established procedures.

Note 1:

Particular attention shall be given to following risk control measure related to high voltage hazards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and rewinding three phase induction machines rated for high voltage to 3.3 kV. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.10 High voltage motor winding, conductors, connections methods and insulation
- 2.6.31.4 High voltage three phase motor winding techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to dismantling and winding stators for at least two different three phase induction machines at for HV to 3.3 kV in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Rewind three phase induction machines rated for high voltage to 3.3 kV as described as described in 7) and including:
    - A Dismantling machine and storing parts securely.
    - B Preparing stator for winding.
    - C Following winding specifications.
    - D Selecting correct coils and insulation.
    - E Winding and connecting stator correctly.
    - F Assembling machine and preparing for testing.
    - G Adhering to quality procedures.
    - H Completing work report/forms accurately.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in rewinding three phase induction machines rated for high voltage to 3.3 kV

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG057A Conduct electrical tests on low voltage electrical machines

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
1 Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4, 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEEG056A      Rewind three phase induction machines rated for high voltage above 3.3 kV**

**Unit Descriptor**                      **1)**

This unit covers preparing, placing and connecting coils and insulating three phase stators and rotors rated for high voltage above 3.3 kV. It encompasses working safely, using hand and powered tools, measuring, applying knowledge of electrical circuits and HV stator windings, applying technical and quality standards and keeping winding records.

**Prerequisite Unit(s)**                **2)**

**Competencies**                        **2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG055A      Rewind three phase induction machines rated for high voltage to 3.3 kV

**Literacy and numeracy skills**                **2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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**Application of the Unit**                                      **3)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

**Licence to practise**                      **3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field**                        **4)**

Electrical

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to rewind three phase induction machines.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures for work preparation are followed.</p> <p>1.3 The extent of the work is determined from job sheets, specifications and regulatory requirements.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Induction machine is dismantled and parts tagged and stored to prevent loss or damage.</p> <p>1.6 Winding data is obtained from winding data records or directly from measurements of stator and recorded in accordance with established procedures.</p> <p>1.7 Winding is stripped from stator in accordance with established procedures.</p> <p>1.8 Materials required for the work are obtained in accordance with established procedures and procedures.</p> <p>1.9 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Rewind three phase induction machines.	<p>2.1 Established OHS risk control work measures are followed.</p> <p>2.2 Machines/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures. (See Note 1).</p> <p>2.3 Induction machine is dismantled and parts tagged and stored to prevent loss or damage.</p> <p>2.4 Winding is stripped from stator in accordance with established procedures.</p> <p>2.5 Stator is wound and insulated to 3.3 kV standards in accordance with winding data and established procedures.</p>

- |   |                       |  |   |
|---|-----------------------|--|---|
|   | 2.6                   | Machine is assembled and prepares for final testing in accordance with established procedures.                         |   |
|   | 2.7                   | Prescribed solutions are used to resolve work completion issues.   |   |
|   | 2.8                   | Routine quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape. |   |
|   | 2.9                   | Work is completed in acceptable timeframe given environment and workplace conditions.                                  |   |
| 3 | Complete work report. | 3.1  | OHS measures work completion risk controls are followed.  |
|   |                       | 3.2  | Work report forms/data sheets are completed accurately in accordance with established procedures. |

Note 1:

Particular attention shall be given to following risk control measures related to high voltage hazards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and rewinding three phase induction machines rated for high voltage above 3.3 kV. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |  |
|--|----------|--|
|  | 2.1.10   | High voltage motor winding, conductors, connections methods and insulation |
|  | 2.6.31.4 | High voltage three phase motor winding techniques                          |
|  | 2.18.1   | Occupational Health and Safety principles                                  |
|  | 2.18.2   | Electrical Safe working practices  |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to dismantling and winding stators for at least two different three phase induction machines at for HV to 3.3 kV in an environment designed specifically for the purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Rewind three phase induction machines rated for high voltage above 3.3 kV as described as described in 7) and including:
    - A Dismantling machine and storing parts securely.
    - B Preparing stator for winding.
    - C Following winding specifications.
    - D Selecting correct coils and insulation.
    - E Winding and connecting stator correctly.
    - F Assembling machine and preparing for testing.
    - G Adhering to quality procedures.
    - H Completing work report/forms accurately.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in 'Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in rewinding three phase induction machines rated for high voltage above 3.3 kV.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG055A    Rewind three phase induction machines rated for high voltage to 3.3 kV

UEENEEG058A    Conduct electrical tests on high voltage electrical machines

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.6; 3.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.3; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4

## **UEENEEG057A      Conduct electrical tests on low voltage electrical machines**

### **Unit Descriptor**

**1)**

This unit covers electrical safety and functional testing of electrical machines designed to operate at low voltage. The unit encompasses working safely, setting up and conducting continuity, insulation and short circuit and inspection and testing of iron circuit, interpreting and documenting test results and any resulting corrective actions.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG008A    Find and repair faults in electrical apparatus and circuits

OR

UEENEEG053A    Rewind three phase induction machines rated for low voltage

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to conduct electrical tests on three phase induction machines.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures for work preparation are followed.
- 1.3 The extent of the work is determined from job sheets, specifications and regulatory requirements.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Winding data is obtained from winding data records or directly from measurements of stator and recorded in accordance with established procedures.
- 1.6 Winding is stripped from stator in accordance with established procedures.
- 1.7 Materials required for the work are obtained in accordance with established procedures.
- 1.8 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Conduct electrical tests on three phase induction machines.

- 2.1 Established OHS risk control work measures are followed.
- 2.2 Machines/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.3 All necessary electrical tests are conducted to established cause of faults or operational condition of the machine.
- 2.4 Status of the machine is determined from test results and recorded.

- |   |                       |   |
|---|-----------------------|---|
|   | 2.5                   | Prescribed solutions are used to resolve work completion issues.  |
|   | 2.6                   | Routine quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape.    |
|   | 2.7                   | Work is completed in acceptable timeframe given environment and workplace conditions.                                     |
| 3 | Complete work report. | 3.1 OHS measures work completion risk controls are followed.  |
|   |                       | 3.2 The status of the machine is documented in accordance with established procedures and appropriate person(s) notified. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conducting electrical tests on low voltage electrical machines. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |           |  |
|--|-----------|--|
|  | 2.7.4.1   | Electrical installations, protection methods and devices |
|  | 2.11.20.1 | Low voltage motor testing devices and techniques         |
|  | 2.18.1    | Occupational Health and Safety principles                |
|  | 2.18.2    | Electrical Safe working practices                        |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to conducting electrical tests on at least two different low voltage electrical machines with one of the machines having at least two winding faults. The purpose of the tests is to establishing:

- - The causes of faults in machines, and
  - Whether a machine as been correctly repaired and complies with all requirements

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct electrical tests on low voltage electrical machines as described as described in 7) and including:
    - A Dismantling machine and storing parts securely.
    - B Setting up tests correctly.
    - C Taking test reading accurately.
    - D Determining the status of the machine correctly from test result.
    - E Documenting the status of the machine clearly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:  
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and  
specific  
resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice

**assessment** using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting electrical tests on low voltage electrical machines.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG008A Find and repair faults in electrical apparatus and circuits

OR

UEENEEG053A Rewind three phase induction machines rated for low voltage

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEG058A Conduct electrical tests on high voltage electrical machines

### Unit Descriptor

1)

This unit covers electrical safety and functional testing of electrical machines designed to operate at high voltage. The unit encompasses working safely, setting up and conducting continuity, insulation and short circuit and inspection and testing of iron circuit, interpreting and documenting test results and any resulting corrective actions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG057A Conduct electrical tests on low voltage electrical machines

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Electrical

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to conduct electrical tests on three phase induction machines.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures for work preparation are followed.</p> <p>1.3 The extent of the work is determined from job sheets, specifications and regulatory requirements.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Winding data is obtained from winding data records or directly from measurements of stator and recorded in accordance with established procedures.</p> <p>1.6 Winding is stripped from stator in accordance with established procedures.</p> <p>1.7 Materials required for the work are obtained in accordance with established procedures.</p> <p>1.8 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Conduct electrical tests on three phase induction machines.	<p>2.1 Established OHS risk control work measures are followed.</p> <p>2.2 Machines/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures. (See Note 1)</p> <p>2.3 All necessary HV electrical tests are conducted to established cause of faults or operational condition of the machine.</p> <p>2.4 Status of the machine is determined from test results and recorded.</p> <p>2.5 Prescribed solutions are used to resolve work completion issues.</p> <p>2.6 Routine quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape.</p>

- |   |                       |   |
|---|-----------------------|---|
|   | 2.7                   | Work is completed in acceptable timeframe given environment and workplace conditions.                                 |
| 3 | Complete work report. | 3.1 OHS measures work completion risk controls are followed.  |
|   | 3.2                   | The status of the machine is documented in accordance with established procedures and appropriate person(s) notified. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conducting electrical tests on high voltage electrical machines. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.11.20.2 High voltage motor testing devices and techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to conducting electrical tests on at least two different high voltage electrical machines with one of the machines having at least two winding faults. The purpose of the tests is to establishing:

- - The causes of faults in machines, and
  - Whether a machine as been correctly repaired and complies with all requirements

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct electrical tests on high voltage electrical machines as described as described in 7) and including:
    - A Dismantling machine and storing parts securely.
    - B Setting up tests correctly.
    - C Taking test reading accurately.
    - D Determining the status of the machine correctly from test result.
    - E Documenting the status of the machine clearly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting electrical tests on high voltage electrical machines

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG057A Conduct electrical tests on low voltage electrical machines

The critical aspects of occupational health and safety covered in Unit UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEEG059A      Conduct mechanical tests on electrical machines**

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers mechanical safety and functional testing of electrical machines and their mechanical components. The unit encompasses working safely, setting up and conducting tests, taking measurements, interpreting and documenting test results and any resulting corrective actions.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.  UEENEEG057A    Conduct electrical tests on low voltage electrical machines
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading        4        Writing        4        Numeracy        4
<b>Application of the Unit</b>	<b>3)</b>  This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.
<b>Competency Field</b>	<b>4)</b>  Electrical

ELEMENT	PERFORMANCE CRITERIA
<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to conduct mechanical tests on electrical machines.</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures for work preparation are followed.</p> <p>1.3 The extent of the work is determined from job sheets, specifications and regulatory requirements.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Machine data is obtained from data records or directly from measurements and recorded in accordance with established procedures.</p> <p>1.6 Winding is stripped from stator in accordance with established procedures.</p> <p>1.7 Materials required for the work are obtained in accordance with established procedures.</p> <p>1.8 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
<p>2 Conduct mechanical tests on three phase induction machines.</p>	<p>2.1 Established OHS risk control work measures are followed.</p> <p>2.2 Machines/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p style="margin-left: 40px;">Note: Particular attention shall be given to following risk control measure related to high voltage hazards</p> <p>2.3 All necessary mechanical tests/measurements are conducted to established cause of faults or operational condition of the machine.</p> <p>2.4 Status of the machine is determined from test results and recorded.</p> <p>2.5 Prescribed solutions are used to resolve work completion issues.</p>

- |   |                       |   |
|---|-----------------------|---|
|   | 2.6                   | Routine quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape.  |
|   | 2.7                   | Work is completed in acceptable timeframe given environment and workplace conditions.   |
| 3 | Complete work report. | 3.1 OHS measures work completion risk controls are followed.  |
|   |                       | 3.2 The status of the machine including specifications for any repair work required is documented in accordance with established procedures and appropriate person(s) notified. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conducting mechanical tests on electrical machines. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |           |  |
|-----------|--|
| 2.6.31.5  | Electrical machines, mechanical components                             |
| 2.11.20.3 | Electric motor mechanical measuring and testing devices and techniques |
| 2.18.1    | Occupational Health and Safety principles                              |
| 2.18.2    | Electrical Safe working practices                                      |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to conducting mechanical tests on at least two different electrical mechanical with one of the machines having at least two mechanical faults. The purpose of the tests is to establishing:

- - The causes of faults in machines, and
  - Whether a machine as been correctly repaired and complies with all requirements

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct mechanical tests on electrical machines as detailed as described in 7) and including:
    - A Dismantling machine and storing parts securely.
    - B Setting up tests correctly.
    - C Taking test/measurements reading accurately.
    - D Determining the status of the machine correctly from test result.
    - E Documenting the status of the machine clearly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting mechanical tests on electrical machines.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG057A Conduct electrical tests on low voltage electrical machines

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEG060A Evaluate performance of electrical machines

### Unit Descriptor

1)

This unit covers electrical and mechanical safety and performance evaluation of electrical machines across their load range. The unit encompasses working safely, setting up and conducting evaluation measurements, evaluating performance from measured parameters and documenting results and recommending any resulting corrective actions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG057A Conduct electrical tests on low voltage electrical machines

AND

UEENEEG043A Develop engineering solution for synchronous machine problems

OR

UEENEEG044A Develop engineering solution for d.c. machine problems

OR

UEENEEG045A Develop engineering solution for induction motor problems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for

this standard at the aligned AQF 5 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to evaluate electrical machines.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Examination and testing area is checked for safety hazards and risk control measures implemented in strict accordance with safety policy and procedures.
- 1.4 Relevant documentation is obtained and read to determine the certification/approval specifications for which the equipment is to be assessed.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety.

- |   |  |     |   |
|---|--|-----|---|
| 2 | Evaluate electrical machines.                | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |  | 2.2 | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.    |
|   |  | 2.3 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.                                     |
|   |  | 2.4 | In depth knowledge of the performance requirements of the particular electrical machine under scrutiny is applied to the assessment process.                    |
|   |  | 2.5 | Machine examination and tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny.               |
|   |  | 2.6 | Machine examination and tests are carried out methodically and results and comments systematically noted.   |
|   |  | 2.7 | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |  | 2.8 | Assessment is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practices.                  |
| 3 | Complete work and document evaluate results. | 3.1 | OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3 | Examination and test results are evaluated and non-compliance issues identified.  |
|   |  | 3.4 | Examination, test results and comments on non-compliance issues are documented and reported to appropriate person(s) in accordance with established procedures. |

Note 1:

Examples of documentation are those specifying safety requirements, technical standard, as marketed technical performance and product quality endorsement standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and evaluating performance of electrical machines. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.22	Performance standards and regulatory requirements for the electrical rotating machine
2.6.31.6	Electrical machines, performance monitoring
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to at least two different types of electrical machine:

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Evaluate performance of electrical machines as described as described in 7) and including:
    - A Interpreting compliance documents.
    - B Setting up and conducting appropriate examinations and tests.
    - C Identifying non-compliance defects.
    - D Reporting examination and test results and non-compliance issues clearly and accurately.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in evaluating performance of electrical machines.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG059A Conduct mechanical tests of electrical machines

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

# UEENEEG061A Design and develop modifications to electrical machines

## Unit Descriptor

1)

This unit covers the performance and efficiency aspects of electrical machine design as applied to the modification of existing machines. It encompasses designing to given parameters including those related to safety and efficiency, adhering to compliance standards and compliance assessments and documentation.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG060A Evaluate performance of electrical machines

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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## Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

## Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to design and develop modifications to electrical machines.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 The extents of modifications required are determined from performance test results and customer’s requirements.
- 1.3 Original specification documents for the machine are sought and received in order to check currency of compliance requirements. (see note 1)
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in or relying on outcomes of the work.

2 Design modifications to electrical machines.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 In depth knowledge of electrical machine and sustainable energy policies in improving machine efficiency is applied to modification design.
- 2.3 Modifications are designed to comply with the requirements of Standards and regulations.
- 2.4 Acceptance/approval for modification design is sought from appropriate person(s) in accordance with established procedures.
- 2.5 Specifications and instructions for the modification work are documented and processed in accordance with requirements.
- 2.6 Solutions to unplanned or unforeseen events are provided consistent with safety and work outcomes.

3 Arrange modification work.

- 3.1 OHS risk control measures and procedures for carrying out the work are followed.

- |   |                          |  |
|---|--------------------------|--|
|   | 3.2                      | Arrangements are made for the modification work to be done in accordance with established procedures.  |
|   | 3.3                      | A copy of modification specifications and instructions is provided to personnel responsible for carrying out the work.                             |
|   | 3.4                      | Strategies are implemented that verify that modification conforms to specifications.   |
|   | 3.5                      | Solutions to unplanned or unforeseen events are provided consistent with safety and work outcomes.   |
| 4 | Complete work and report |  |
|   | 4.1                      | OHS work completion risk control measures and procedures are followed.   |
|   | 4.2                      | Arrangements are made for formal certification of modifications where required by regulation or customer.  |
|   | 4.3                      | Machine marking is revised to comply with performance parameters resulting from modifications.   |
|   | 4.4                      | Modification and machine performance standard are documented and report issued to appropriate person(s) in accordance with established procedures. |

Note 1:

Examples of documentation are those specifying safety requirements, technical standard, as marketed technical performance and product quality endorsement standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and developing modifications to electrical machines. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.6.28   | Motor windings                            |
| 2.8.10.2 | Engineering Maths                         |
| 2.18.1   | Occupational Health and Safety principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing and developing modifications to at least two different types of electrical machines.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and develop modifications to electrical machines as described as described in 7) and including:
    - A Determining the extent of work correctly.
    - B Designing modification to meet requirements.
    - C Documenting modification specifications clearly.
    - D Arranging for formal certification of modifications.
    - E Completing final report.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing and developing modifications to electrical machines.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEG062A Set up and place electrical apparatus and associated circuits into service

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers adjusting and setting up electrical apparatus before placing and checking that they operate as intended. It encompasses working safely and to standards, following specified set up procedures, ensuring safety devices are correctly set, evaluating apparatus and circuit operation against specified parameters and completing necessary documentation.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEG005A    Verify compliance and functionality of general electrical installations</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit require a licence to practise in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.</p> <p>Note:</p> <p>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting</p>						

equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.  
 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measure and the like

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to set up electrical apparatus and associated controls

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate person(s).
- 1.4 Setting up work is appropriately sequenced in accordance with job schedule
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.6 The location of electrical apparatus and controls is determined from site inspection and/or job specifications and diagrams
- 1.7 Control setting and operating parameters are determined from job specifications and requirements.
- 1.8 Tools, equipment and testing devices needed to commission the system are obtained in accordance with established procedures and checked for correct operation and safety
- 1.9 Pre set up checks are undertaken to ensure all components are in place and secure.

	1.10	The need to test or measure a live and operating system is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures	
2	Set up electrical apparatus and associated controls	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
		2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		2.4	Electrical apparatus and associated controls are adjusted to their required settings.
		2.5	Testing/measuring devices are used to observe the operation of electrical apparatus and fine adjustments of controls are made as necessary.
		2.6	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
		2.7	Setting up is conducted efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3	Document operational settings of electrical apparatus and associated circuits.	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Results of setting up are documented including final operating parameters and an appropriate person or persons notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and setting up and placing electrical apparatus and associated circuits into service. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.2 Enterprise work activities records
- 2.2.4 Problem solving techniques
- 2.2.5 Enterprise customer relations protocols
- 2.2.43 Commissioning processes and procedures
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to commissioning electrical apparatus and associated controls. Types of electrical apparatus and controls are motor switching and control, relevant parts of general electrical installations, process plants or production plant.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be

required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up and place electrical apparatus and associated circuits into service as described as described in 7) and including:
    - A Selecting appropriate testing/measuring devices.

- B Making initial adjustments of apparatus and controls correctly.
- C Finely adjusting apparatus and controls based of measured observations.
- D Documenting final operating parameters accurately.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up and placing electrical apparatus and associated circuits into service.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4

for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.4 to 2.8	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 2.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.7; 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.7; 2.8	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6; 3.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9

## UEENEEG064A Repair mechanical components of electrical machines

### Unit Descriptor

1)

This unit covers the repair of mechanical components of electrical machines including basic machining. The unit encompasses working safely and to standards, following written instructions and drawing, selecting and setting up machine tools, basic machining, measuring and documenting work activities.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, diagrams, schedules and manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to repair component.

1.1 OHS procedures for a given work area are obtained and understood through established routines and procedures.

1.2 Established OHS risk control measures and procedures in preparation for the work are followed.

1.3 Safety hazards which have not previously been identified are reported and advise on risk control measures are sought from the work supervisor.

1.4 The nature of repair work is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.

1.6 Sources of materials that may be required for the work are established in accordance with established routines and procedures.

1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

1.8 Appropriate machine is selected, checked for safety and prepared for any necessary machining operation.

1.9 Cutting tools are selected, sharpened and set up for correctly for each particular machining operation.

2 Repair components.

2.1 Established OHS risk control measures and procedures for carrying out the work are followed.

2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

2.3 Component being machined is positioned and clamped appropriately.

- |   |                           |   |  |
|---|---------------------------|---|--|
|   | 2.4                       | Machining is carried out safely and to suit the component and material being machined.  |  |
|   | 2.5                       | Appropriate measurements are taken to ensure repairs comply with technical standards and job specifications and requirements.                                     |  |
|   | 2.6                       | Components are repaired to comply with technical standards and job specifications and requirements.   |  |
|   | 2.7                       | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.                                       |  |
|   | 2.8                       | Unexpected situations are dealt with safely and with the approval of an authorised person.  |  |
|   | 2.9                       | Ongoing checks of the quality of repair work are undertaken in accordance with established procedures.  |  |
|   | 2.10                      | Repairs are carried out efficiently without unnecessary waste of materials and energy and damage to apparatus, circuits, the surrounding environment or services. |  |
| 3 | Complete work and report. | 3.1   | OHS work completion risk control measures and procedures are followed.   |
|   |                           | 3.2   | Work area is cleaned and made safe in accordance with established procedures.  |
|   |                           | 3.3   | Fits are made to verify that repaired component conforms to requirements.  |
|   |                           | 3.4   | Work completion is documented and an appropriate person or persons notified in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and repairing mechanical components of electrical machines. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.6.31.5 | Electrical machines, mechanical components |
| 2.11.2.2 | Electrical workshop machines               |
| 2.18.1   | Occupational Health and Safety principles  |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to repairs at least two of the following electrical machine components:

- Shaft
- Bearing housing
- End shield
- Fan
- Coupling
- Machine housing

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries

risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Repair mechanical components of electrical machines as described as described in 7) and including:
    - A Establishing the nature of the repair work.
    - B Selecting appropriate method of repair.
    - C Sharpening cutting tools/twist drills correctly.

- D Securing work piece correctly.
- E Repairing component to required standard.
- F Documenting repairs in accordance with established procedures.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in repairing mechanical components of electrical machines.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4	2

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 3.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.3; 3.2; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4

## UEENEEG065A Maintain and service traction lifts

### Unit Descriptor

1)

This unit covers maintenance and servicing of traction lift systems and equipment. It encompasses working safely, conducting site cleaning, lubricating and painting lift equipment, inspecting of suspension, governors, compensators, floor selector and tappet switch ropes, and carrying out periodic testing on lift safety gear.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEG016A Diagnose and rectify faults in lift systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit applies to any formal recognition for this standard at the aligned AQF 3/4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Prepare to maintain and service lift equipment.</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 The likely extent of work to be undertaken is envisaged from maintain procedures or fault/breakdown reports and/or discussions with appropriate person(s).</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
<p>2 Maintain and service lift equipment.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measured and devised and implemented in consultation with appropriate personnel.</p>
<p>3 Completion and report of maintain and servicing activities</p>	<p>3.1 OHS work completion risk control measures and procedures are followed.</p>

- 3.2 Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.
- 3.3 Maintenance work activities are documented in accordance with established procedures.

Note.

Examples of documentation are components fault reports, test results, authorisations, permits, parts/component dispatch and store records

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining and servicing traction lifts. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.39 • Lubrication of lift component
- 2.6.40 Lift systems, roping
- 2.6.41 Lift systems, rope inspection
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Competency shall be demonstrated in relation to maintaining and servicing at least two of the lift equipment as following:

- Geared traction drive
- Gearless traction drive
- Drum drive
- Suspended electro-hydraulic drive
- At least two of the roping systems as following:
  - Single or double wrap
  - Single or multiple fall
  - Side slung or underslung
  - Overhead or basement drive
  - Drum drive.
  - And at least two of the components as following:
    - Suspension ropes
    - Governor ropes

- Tappet ropes
- Compensator ropes
- Floor selector tapes/ropes
- All safety gear periodic tests as following:
  - Governor type A
  - Governor type B
  - Governor type C

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or

less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain and service traction lifts as described as described in 7) and including:
    - A Conduct site cleaning, lubricating and painting of lift equipment.
    - B Inspect lift ropes.
    - C Maintain electro-hydraulic lift equipment.
    - D Carry out lift safety gear periodic testing.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining and servicing traction lifts.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.5	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4; 2.3; 3.2; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.4

## **UEENEEG066A    Install and maintain escalators, moving walks and tread ways**

### **Unit Descriptor**

**1)**

This unit covers installation and maintenance of escalators, moving walks and tread ways. It encompasses working safely, installing and maintaining escalators, moving walks and tread ways such as repair or replacement of escalator handrails, cleaning, lubricating, replacement and adjustment of escalator/moving walk/tread way mechanical components and/or the installation and commissioning of escalators/moving walks/tread ways.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEG016A    Diagnose and rectify faults in lift systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	5
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### **Application of the Unit**

**3)**

This unit applies to any formal recognition for this standard at the aligned AQF 3/4 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install and maintain of escalators, moving walks and tread ways.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The likely extend of work to be undertaken is envisaged from maintain procedures or plans/specifications and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Install and maintain escalators, moving walks and/or tread ways

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measured and devised and implemented in consultation with appropriate personnel.
- 2.5 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.

- |   |  |   |
|---|--|---|
|   | 2.6  | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   | 2.7  | Ongoing checks of the quality of installed/maintain apparatus are undertaken in accordance with established procedures.   |
|   | 2.8  | Apparatus installation/maintenance is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.                     |
| 3 | Completion and report of install and maintain activities |   |
|   | 3.1  | OHS work completion risk control measures and procedures are followed.  |
|   | 3.2  | Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.   |
|   | 3.3  | Maintenance work activities are documented in accordance with established procedures.<br>Note.<br>Examples of documentation are components fault reports, test results, authorisations, permits, parts/component dispatch and store records |
|   | 3.4  | Final checks are made to that the installed/maintained apparatus conforms to requirements.  |
|   | 3.5  | ‘As-installed’ apparatus and associated equipment is documented and an appropriate person or persons notified in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintenance of escalators, moving walks and tread ways.. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.6.39 | • Lubrication of lift component                 |
| 2.6.42 | Escalators, moving walk and tread way mechanics |
| 2.18.1 | Occupational Health and Safety principles       |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Competency shall be demonstrated in relation to installing and maintaining at least one of the following:

- Escalators (single or multiple units)
- Moving walks (single or multiple units)
- Tread ways (belt or pallet type)
- At least five of the following:
  - Handrails
  - Steps
  - Pallets
  - Step-chains and associated driving equipment
  - Chains
  - Combs
  - Guards
  - Balustrades
  - Step rollers
  - Newel rollers
  - Motors
  - Controllers
  - Safety devices

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and maintenance of escalators, moving walks and tread ways as described in 7) and including:
    - A Escalators.
    - B Moving walks.
    - C Tread ways.
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installation and maintenance of escalators, moving walks and tread ways.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEG067A **Align and install lift equipment**

### Unit Descriptor

1)

This unit covers alignment and installation of lift mechanical and electrical equipment. It encompasses working safely, alignment of lift structures such as measuring, marking out and aligning of lift installations including machine room equipment, lift well equipment, the lift car and associated equipment and landing door frames and doors, setting out of multiple lift wells in varying configuration and the installations of well and pit equipment, lift car equipment, superstructure and counterweights, machine room equipment, landing, door frames and door, landing buttons and indicator boxes.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEG016A Diagnose and rectify faults in lift systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	5
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### Application of the Unit

3)

This unit applies to any formal recognition for this standard at the aligned AQF 3/4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to align and install lift equipment.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The likely extend of work to be undertaken is envisaged from site plans, drawings and specifications and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Tools, equipment and alignment devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Align and Install lift equipment.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Equipment are installed straight and square in the required locations and within acceptable tolerances.
- 2.5 Equipment align and install in accordance with manufacture’s specifications and regulatory requirements.
- 2.6 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.

	2.7	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.8	Ongoing checks of the quality of installed equipment are undertaken in accordance with established procedures.
	2.9	Equipment installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
3	Completion and report of alignment and installation activities	3.1 OHS work completion risk control measures and procedures are followed.
		3.2 Work site is cleaned and made safe in accordance with established procedures.
		3.3 Final checks are made to that the installed equipment conforms to requirements.
		3.4 ‘As-installed’ equipment is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and aligning and installing lift equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.6.43 | • Lift systems, plumbing and setting out  |
| 2.6.44 | Lift equipment alignment techniques       |
| 2.18.1 | Occupational Health and Safety principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Competency shall be demonstrated in relation to align and install at least two of the following:

- Lift well equipment
- Lift cars
- Machine room equipment

- Lift well alignment
- Lift car alignment
- Machine room alignment

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Align and install lift equipment as described in 7) and including:
    - Install at least two types of the following lift equipment as described below
      - A Lift well equipment.
      - B Lift cars.
      - C Machine room equipment.
    - Carry out at least two types of set out and alignment functions as listed below:
      - A Lift well alignment.
      - B Lift car alignment.
      - C Machine room alignment.

- D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in aligning and installing lift equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1, 1.3 to 1.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.4; 1.4; 2.5; 2.6	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.6	
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEG068A **Diagnose and rectify faults in complex lift systems**

### **Unit Descriptor**

1)

This unit covers diagnosing and rectifying faults in complex traction lift systems and equipment. It encompasses working safely; replacing and/or adjustment of solid state/electrical circuitry and components, diagnosing and repairing of complex faults in lift circuits and associated components (including governors, brakes, safety gear, safety devices, lift machines, door components and controllers).

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEG016A Diagnose and rectify faults in lift systems

UEENEEH043A Diagnose and rectify faults in digital sub-systems of electronic controls

UEENEEH044A Diagnose and rectify faults in analogue circuits in electronic controls systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any formal recognition for this standard at the aligned AQF 4/5 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations

directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The likely extend of work to be undertaken is envisaged from maintain procedures or fault/breakdown reports and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measured and devised and implemented in consultation with appropriate personnel.

- 2.5 Logical diagnostic methods are applied to diagnose lift system apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
  - 2.6 Suspected fault scenarios are tested as being the cause(s) of system fault.
  - 2.7 Cause of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the lift systems.
  - 2.8 Faults in the lift components of the system are rectified to raise apparatus and system to its operational standard.
  - 2.9 System is tested to verify that the system operates as intended and to specified requirements
  - 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
  - 2.11 Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault diagnosis and rectification activities
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
    - Note.  
Examples of documentation are components fault reports, test results, authorisations, permits, parts/component dispatch and store records
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and managing electrical projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.45 Lift components, electrical/electronic

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Competency shall be demonstrated in relation to diagnosing and rectifying faults in complex lift circuits and associated components for at least three (3) types of lift equipment as listed:

- Emergency light units
- D.C. power supplies
- Variable voltage controllers
- Variable speed hoist motor control
- Variable speed door motor control
- Electronic lift controls
- Lift remote monitoring equipment

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling

employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in complex lift systems as described in 7) and including:
    - Release passengers from a lift, which has become immobilised as specified in the Performance Criteria and Range Statement
    - Diagnose and repair faults in lift circuits and associated components for at least three types of lift circuits/components as follows:
      - A Governors.
      - B Brakes.
      - C Safety gear.
      - D Safety devices.
      - E Lift machines.
      - F Door components.
      - G Controllers.
    - Replace and/or adjustment of lift equipment in at least three types of lift equipment as described below:
      - A Electro-hydraulic lift.
      - B Electric traction lift.
      - C Passenger lift.
      - D Goods lift.

And

- A Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

**assessment**

This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in complex lift systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG016A Diagnose and rectify faults in lift systems

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1, 1.3 to 1.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.4; 1.4; 2.5; 2.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEG069A Manage electrical projects

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the management of electrical projects involving design, modifications, installation, and/or maintenance of systems and equipment. The unit encompasses management of safety, budget variation, personnel, resources, critical path timelines and completion documentation.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Reading</td> <td style="width: 5%;">5</td> <td style="width: 25%;">Writing</td> <td style="width: 5%;">5</td> <td style="width: 25%;">Numeracy</td> <td style="width: 5%;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Electrical</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Establish the scope of the project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.3 Project deliverables and budget are established from project planning and other relevant documentation and from discussions with appropriate person(s).</p> <p>1.3 Measurable outcomes are identified to evaluate the project on completion from project planning and other relevant documentation.</p> <p>1.4 Plant, materials and skills needed to meet project outcome are established from project planning and other relevant documentation.</p> <p>1.5 Processes and procedures are developed for managing contract variations from discussions with appropriate person(s) and in accordance with contractual agreement.</p>
2 Manage project.	<p>2.1 OHS policies, procedures and programs are implemented and monitored.</p> <p>2.2 Achievement of project outcomes is delegated to appropriately competent persons involved in the project.</p> <p>2.3 Risk events are identified and project plan strategies implemented to ensure that outcomes are achieved to the required standard of quality specified in the contract and safety required by organization's policy.</p> <p>2.4 Procurement processes and procedures are monitored to ensure on time supply of plant and materials and in accordance with organisation's policy.</p> <p>2.5 Project progress is monitored against schedule, quality requirements and budget.</p> <p>2.6 Conflict issues at the work site and between stakeholders, clients and regulators are identified and managed in accordance with organisation's policy.</p>

- 2.7 Variations are managed in accordance with agreed processes and in accordance with the contract.
- 2.8 Project records are maintained and progress reports written and forwarded to all appropriate person(s).
- 3 Complete project.
  - 3.1 Project outcomes are reviewed against original plan, implemented risk strategies, contract variations, safety record and budget.
  - 3.2 Project completion acceptance is sought from appropriate person(s) and hand-over documented in accordance with organisation's policy.

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and managing electrical projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.17 Project management
- 2.2.19 Customer/Client relations
- 2.2.28 Electrical industry sector customs and practices
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to managing an industry accepted medium sized electrical project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Manage electrical projects as described in 7) and including:
    - A Establishing the scope of the project accurately.
    - B Ascertaining the input a project.
    - C Developing effective management processes.
    - D Managing resources and variations effectively.
    - E Resolving conflicts.
    - F Adopting risk management strategies.
    - G Maintaining records and submitting progress reports.
    - H Meeting project outcomes.

- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in managing electrical projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.4; 2.6 to 2.8	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3; 2.5; 2.7; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.3; 2.7; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEG070A Plan electrical projects

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers development and documentation of electrical project proposals, milestones and completions. The unit encompasses, establishing budgets, critical path analysis, development of workflow strategies, documenting, presenting and negotiating budgets and timelines.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      5      Writing      5      Numeracy      5
<b>Application of the Unit</b>	<b>3)</b>  This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.
<b>Competency Field</b>	<b>4)</b>  Electrical

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to plan project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established techniques for project planning are reviewed and adopted in accordance with organisation's policies.</p> <p>1.3 The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).</p>
2 Develop project plan proposal.	<p>2.1 Estimated plant, material, labour and other costs are sought and obtained from appropriate person(s) in accordance with organisation's policies and procedures.</p> <p>2.2 Project budget is established from estimated plant, material, labour and other costs in accordance with organisation's policies and procedures.</p> <p>2.3 Knowledge of critical path analysis is applied to developing workflow strategies.</p> <p>2.4 Sources and availability of materials and human resources needed for the project are established in accordance with organisation's policies and procedures.</p> <p>2.5 Risk management strategies are sought and obtained for incorporating in the project plan.</p> <p>2.6 Project plan is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>2.7 Project plan proposal is documented in accordance with organisation's policies and procedures.</p>
3 Obtain approval for project plan.	<p>3.1 Project plan is presented and discussed with person(s) of higher authority.</p> <p>3.2 Alterations to the project plan resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation's policy.</p>

- 3.3 Final project plan is documented and approval obtained from appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and planning electrical projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.16.1 Project planning
- 2.2.18 Critical path and project analysis
- 2.2.28 Electrical industry sector customs and practices
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to managing an industry accepted medium sized electrical project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the

workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan electrical projects as described in 7) and including:
    - A Determining the project requirements accurately.
    - B Establishing a project budget.
    - C Developing effective work flow strategies.
    - D Documenting project plan proposal.
    - E Negotiating alterations to the proposed project plan successfully.
    - F Obtaining approval of the final plan.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in planning electrical projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and

demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6	2

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.6 to 3.2	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.4; 1.6; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.4; 3.1

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 1.7 to 3.2

## UEENEEG071A Install and set up interval metering

### Unit Descriptor

1)

This unit covers the installation and set up of interval metering for measurement of energy use by consumers under choice of supplier arrangement. It encompasses working safely and to installation and set up standards, evaluating the integrity of metering wiring and earthing systems, fixing metering, making power and communication connections, setting meter parameters and completing the necessary documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEF002A Lay and connect cables for multiple access to telecommunication services

UEENEEG005A Verify compliance and functionality of general electrical installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require:

- licence to practise in the workplace subject to regulations for undertaking of electrical work, and
- registration to practise in the workplace subject to requirements set out ACA 'Open' Cabling Provider Rule

Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install and set up interval metering.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented. (Note 1.)
- 1.4 Switchboard on which the meter is to be installed is inspected and evaluated for compliance with safety and functionality standards. (Note 2)
- 1.5 Approval to rectify safety and/or functionality defects of the switchboard is sought from person of higher authority in accordance with established procedures.
- 1.6 Installation of the meter and rectification work is prepared in consultation with other effected by the work and sequenced appropriately. (Note 3)
- 1.7 Material needed for the work is obtained in accordance with established procedures and checked against job requirements.

- |   |   |  |
|---|---|--|
|   | 1.8   | Tools, equipment and testing devices needed to for the work are obtained in accordance with established procedures and checked for correct operation and safety.   |
| 2 | Install and set up interval metering.                   | 2.1 OHS risk control measures and procedures for carrying out the work are followed.   |
|   | 2.2   | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.   |
|   | 2.3   | Existing metering is checked as being isolated in strict accordance OHS requirements and procedures.   |
|   | 2.4   | Approved rectification work is carried out to comply with standards and in accordance with established procedures.   |
|   | 2.5   | Metering is installed to comply with technical standards and job specifications and requirements.  |
|   | 2.6   | Metering power and communication connections are made in accordance with manufacture’s specifications and functional and regulatory requirements.  |
|   | 2.7   | Meter operating parameters are set in accordance with manufacture’s specifications and functional and regulatory requirements.   |
|   | 2.8   | Unexpected situations are dealt with safely and with the approval of an authorised person  |
|   | 2.9   | Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.   |
|   | 2.10  | Metering installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles. |
| 3 | Completion and report metering installation activities. | 3.1 OHS work completion risk control measures and procedures are followed and supply is reinstated to the installation.  |
|   | 3.2   | Work site is cleaned and made safe in accordance with established procedures.  |
|   | 3.3   | Final checks are made to that the installed metering conforms to requirements.   |

- 3.4 'As-installed' metering and rectification work is documented and appropriate persons notified in accordance with established procedures.

Note.

1. Examples of hazards likely to be encountered are asbestos reinforced switchboard panels, deteriorating switchgear and cabling and location of the switchboard.
2. Safety and functionality standards include the clear identification of switchboard components and their function, sound electrical insulation of wiring and components, sound MEN and main earth connections, fire integrity and access.
3. Preparation includes arranging for the safe isolation of the installation, access to a telecommunications connection where two-way metering is to be installed and access to a transducer connection where gas metering is to be included.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and setting up interval metering. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.5.2.1 | Technical standards, regulations and codes for general electrical installations |
| 2.5.12  | Electricity distributors, supply requirements                                   |
| 2.6.2.2 | Electrical metering arrangements  |
| 2.6.2.3 | Interval metering concepts and applications                                     |
| 2.18.1  | Occupational Health and Safety principles                                       |
| 2.18.2  | Electrical Safe working practices   |

## RANGE STATEMENT

- 7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the installation of at least:

- a single phase interval meter
- a two-way interval meter
- an interval meter where compliance rectification work is required

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and set up interval metering as described in 7) and including:
    - A Inspecting and evaluating safety and functionality compliance of the switchboard accurately.
    - B Following established procedures to obtain approval to rectify non-compliance aspects of the switchboard.
    - C Carrying out preparation work effectively.
    - D Rectifying compliance defects.
    - E Placing and securing metering correctly.
    - F Making power and communications connections in accordance with manufacture's specifications and functional and regulatory requirements.
    - G Setting meter parameters in accordance with manufacture's specifications and functional and regulatory requirements.
    - H Reinstating supply to the installation safely.

- I Documenting metering and rectification work and notifying appropriate persons in accordance with established procedures.
- J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and setting up interval metering.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4

for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.4; 2.6; 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.7	2

### **Skills Enabling Employment**

#### **8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>

1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 2.8
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.4; 2.4; 2.8

## UEENEEG072A Investigate and report on electrical incidents

### Unit Descriptor

1)

This unit covers investigating and reporting the possible electrical cause of incidents resulting electric shock, injury, fatality or property damage. It encompasses working safely, gathering information from an incident site and from witnesses, conducting site tests, gathering and arranging for analysis of forensic evidence, documenting findings and presenting evidence in court.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG021A Verify compliance and functionality of special electrical installations

UEENEEG023A Conduct compliance inspection of electrical installations with demand exceeding 100 A per phase.

UEENEEG024A Conduct compliance inspection of special electrical installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the work place subject to regulations for undertaking of electrical work. Practice in workplace and

during training is also subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electrical

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to investigate incident

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate person(s).
- 1.4 Notification of the incident is reviewed in consultation with appropriate person(s) to establish the nature and extent of the investigation.
- 1.5 Appropriate person(s) are consulted to ensure the investigation is coordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed for the investigation are obtained in accordance with established procedures and checked for correct operation and safety.

2 Investigate incident

- 2.1 OHS risk control measures and procedures for carrying out the investigation are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- |   |                               |   |   |
|---|-------------------------------|---|---|
|   | 2.3                           | Co-operation of others involved in the investigation is sought and obtained.  |   |
|   | 2.4                           | Recreation of incident situation is only undertaken in strict accordance with OHS requirements and when necessary conducted within established safety procedures.   |   |
|   | 2.5                           | Witnesses to the incident are interviewed in accordance with established procedures and protocols to determine the circumstances of the incident and those leading up to it.  |   |
|   | 2.6                           | Physical evidence of the possible causes of the incident is obtained through inspection and testing are and documented in accordance with established procedures.   |   |
|   | 2.7                           | Forensic evidence gather at the site is handled to avoid contamination or damage and where necessary forwarded to appropriate persons for analysis.   |   |
|   | 2.8                           | Witness statements and evidence gathered at the site is documented in accordance with established procedures and include: <ul style="list-style-type: none"> <li>• Procedures and results of tests undertaken on site;</li> <li>• Forensic evidence removed from site and for analysis;</li> <li>• Aspects of the electrical installation that do not comply with safety standards and requirements.</li> </ul> |   |
|   | 2.9                           | Actions are taken to prevent any unsafe electrical hazards found on the site from posing a risk of any further injury or damage.  |   |
| 3 | Report investigation findings | 3.1   | Reports of forensic evidence analysis are obtained and reviewed for inclusion the final investigation report.               |
|   |                               | 3.2   | Cause or causes of the incident are extrapolated from the evidence using acceptable deductive methods.                      |
|   |                               | 3.3   | Investigation procedures, finding, conclusions and recommendation are documented in accordance with established procedures. |
|   |                               | 3.3   | Investigation report is forwarded to appropriate person(s) in accordance with established procedures.                       |

- 3.5 Where required, evidence as documented in the Investigation Report is given in court honestly and without bias following court procedures and protocols.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and investigating and reporting on electrical incidents. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.49 Procedure and protocols for giving evidence in a court of law.
- 2.7.14 Procedures and processes for responding to reported electrical incidents.
- 2.7.15 Causes and consequence of unsafe and misuse of electrical installations and equipment.
- 2.11.6.1 Advance electrical testing and measuring devices.
- 2.11.6.2 Electrical field testing and measurement techniques.
- 2.18.1 Occupational Health and Safety principles.
- 2.18.2 Electrical Safe working practices.

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by investigating and reporting of at least three of the following incidents involving:

- Reported electric shock.
- Injury from a reported electrical source.
- Fatality from a reported electrical source.
- Property damage from a reported electrical source.

The incidents may occur in a domestic premises, a non-domestic premises or a construction site.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit. It must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Investigate and report on electrical incidents as described in 7) and including:
    - A Establish the nature and extent of the investigation by reviewing initial notification of the incident
    - B Recreating incident situation as accurately as evidence indicates
    - C Interviewing and taking witness statements appropriately
    - D Gathering relevant physical evidence and treating it appropriately
    - E Documenting evidence gathered at the site including:
      - Procedures and results of tests undertaken;
      - Forensic evidence removed for analysis;
      - Aspects of the electrical installation that do not comply with safety standards and requirements
    - F Taking appropriate actions to prevent any unsafe electrical hazards found on the site from posing a risk of any further injury or damage
    - G Using deductive methods to determine the cause or

causes of the incident

- H Documenting investigation procedures, finding, conclusions appropriately
- I Preparing and giving evidence in a court of law honestly and without bias
- J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE024A Compile and produce an Electrotechnology report

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit

**Key competencies**

**8.6)**

Evidence that particular key competencies have been achieved within this competency standard unit is in the context of the

following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key Competencies and levels.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.1; 3.3 to 3.5	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.3 to 2.9	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6;	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 2.3;	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.7; 2.8	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>

1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.1 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:
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TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1H  
H – Electronic Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## **UEENEEH001A Carry out basic repairs to computer equipment by replacement of modules/sub-assemblies**

### **Unit Descriptor**

1)

This unit deals with the repair of computer equipment by replacement of slot/plug connected modules/sub-assemblies. It encompasses safe working practices, following written and oral instruction and procedures, basic testing techniques, dismantling and assembling apparatus and disconnecting and reconnecting components.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electro technology components

UEENEEE007A Use drawings, diagrams, schedules and manuals

AND

UEENEEE004A Solve problems in multiple path circuits

OR

UEENEEE023A Solve basic problems in electronic and digital equipment

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

**Application of the Unit 3)**

This unit may apply to persons entering work in electro technology and may be used in school-based vocational programs.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to repair computer equipment.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work
- 1.3 The nature of the repair is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.

- |   |   |   |  |
|---|---|---|--|
|   | 1.5   | Sources of materials that may be required for the work are established in accordance with established routines and procedures.  |  |
|   | 1.6   | Tools, apparatus and testing devices needed to carry out the work are obtained and checked for correct operation and safety.  |  |
| 2 | Repair computer equipment                   | 2.1   | Established OHS risk control measures and procedures for carrying out the work are followed. |
|   | 2.2   | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.                                      |  |
|   | 2.3   | Circuits/apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |  |
|   | 2.4   | Apparatus is dismantled in accordance with manufacturer's guide and supervisor's instructions.  |  |
|   | 2.5   | Modules/sub-assemblies are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage.                                       |  |
|   | 2.6   | Repairs are affected efficiently without damage to other components, apparatus or circuits.   |  |
|   | 2.7   | Apparatus is assembled in an appropriate sequence with all modules/sub-assemblies and parts correctly placed, secured and connected in accordance with manufacturer's guide or industry practice. |  |
|   | 2.8   | Procedures for referring non-routine events to immediate supervisor for directions are followed.  |  |
|   | 2.9   | Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.                         |  |
| 3 | Complete and report repair work activities. | 3.1   | OHS work completion risk control measures and procedures are followed.                       |
|   | 3.2   | Repaired computer equipment is prepared and forwarded to appropriate person(s) for testing.   |  |
|   | 3.3   | Work area is cleaned and made safe in accordance with established procedures.   |  |

- 3.4 Work supervisor is notified of the completion of the repair work in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out basic repairs to electronic apparatus by replacement of components. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.8 Electronic cable and conductor terminations
- 2.4.11 Personal computers, hardware structure
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out repairs to personal computers and servers.

The repairs shall be limited to:

- Replacement of at least three slot/plug connected modules/sub-assemblies having different functions and in which the fault has been previously established, and
- Repair to broken wires/ribbon cable to industry standards, that may include, minor soldering

Note:

1. Examples of Modules include self contained hardware components such as motherboards, memory cards, storage devices.
2. Examples of Sub-assemblies include collections of integrated components that may form part of a module that are designed to be replaceable for servicing, such as the component part of a hard drive module or motherboard.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out basic repairs to computer equipment by replacement of modules/sub-assemblies as described in 7) and including:
    - A Following manufacturer service instructions for access to components.
    - B Removing at least three different functional types of modules/sub-assemblies in the work instructions.
    - C Replacing modules/sub-assemblies to manufacturer requirements.
    - D Repairing damaged wires/ribbon cable to an industry standard and without damage to other equipments; includes minor soldering.
    - E Reassembling the computer equipment correctly.

- F Testing computer equipment operation.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Relevant Australian and International industry standards for the repair of electronic assemblies and sub-assemblies
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out basic repairs to electronic apparatus by replacement of components.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE002A Dismantle, assemble and fabricate electro technology components
- UEENEEE007A Use drawings, diagrams, schedules and manuals

AND

- UEENEEE003A Solve problems in single path extra low voltage circuits
- UEENEEE004A Solve problems in multiple path circuits

OR

- UEENEEE023A Solve basic problems in electronics and digital equipment

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: NA	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.7	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## **UEENEEH002A Carry out basic repairs to electronic apparatus by replacement of components**

### **Unit Descriptor**

1)

This unit deals the repair or replacement of non-electrical components and replacement of discrete and integrated components and sub systems of electronic apparatus. It encompasses safe working practices, following written and oral instruction and procedures, basic testing and techniques, dismantling and assembling apparatus and disconnecting and reconnecting components.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electro technology components

UEENEEE004A Solve problems in multiple path circuits

UEENEEE007A Use drawings, diagrams, schedules and manuals

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
---------	---	---------	---	----------	---

### **Application of the Unit**

3)

This unit may apply to persons entering work in electro technology and may be used in school based vocational programs.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to

regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to repair electronic apparatus.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the repair is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established routines and procedures.
- 1.6 Tools, apparatus and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Repair electronic apparatus.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- |   |   |   |
|---|---|---|
|   | 2.3   | Circuits/apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |
|   | 2.4   | Apparatus is dismantled in accordance with manufacturer's guide and supervisor's instructions.  |
|   | 2.5   | Component parts are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage.                      |
|   | 2.6   | Repairs are affected efficiently without damage to other components, apparatus or circuits.   |
|   | 2.7   | Apparatus is assembled in an appropriate sequence with all components parts placed, secured and connected in accordance with manufacturer's guide or industry practice.   |
|   | 2.8   | Procedures for referring non-routine events to immediate supervisor for directions are followed.  |
|   | 2.9   | Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Complete and report repair work activities. | 3.1 OHS work completion risk control measures and procedures are followed.  |
|   |   | 3.2 Repaired apparatus is prepared and forwarded to appropriate person(s) for testing.  |
|   |   | 3.3 Work area is cleaned and made safe in accordance with established procedures.   |
|   |   | 3.4 Work supervisor is notified of the completion of the repair work in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out basic repairs to electronic apparatus by replacement of components. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.1.4   | Basic cable and conductor terminations      |
| 2.1.8   | Electronic cable and conductor terminations |
| 2.9.1.1 | Electronic component basics                 |

2.11.11.1 Electronic soldering equipment and techniques

2.18.1 Occupational Health and Safety principles

2.18.9 Electronic safe working practices

## **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out basic repairs electronic apparatus limited to replacement or repair of components, including sub systems in which the fault has been previously established. This shall include at least two different electronic apparatus in which three different types of components and sub systems are faulty one of which requires de-soldering and soldering to affect repairs.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### **Overview of Assessment**

#### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries

risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out basic repairs to electronic apparatus by replacement of components as described in 7) and including:
    - A Following manufacturer service instructions for access to components.
    - B Removing at least three different types of components specified in the work instructions.

- C Replacing components to manufacturer requirements.
- D De-soldering and soldering to a high reliability standard and without damage to components.
- E Reassembling the apparatus correctly.
- F Testing apparatus operation.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note: Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out basic repairs to electronic apparatus by replacement of components.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE002A Dismantle, assemble and fabricate electro technology components
- UEENEEE003A Solve problems in single path extra low voltage circuits
- UEENEEE004A Solve problems in multiple path circuits
- UEENEEE007A Use drawings, diagrams, schedules and manuals

**Key competencies**

**8.6)**  
Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: NA	

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.7	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.8

## UEENEEH003A Carry out routine repairs to business equipment

### Unit Descriptor

1)

This unit covers the confirmation of predictable faults and repair of such faults by repair or replacement of mechanical components and replacement of discrete and integrated components of business electronic equipment. It encompasses safe working practices, following written and oral instruction and routine testing and repair procedures, verifying equipment operation and reporting.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electro technology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, diagrams, schedules and manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety

and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to repair business equipment.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the repair is obtained from documentation or from work supervisor or customer to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established routines and procedures.
- 1.6 Tools, apparatus and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Repair business equipment.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- 2.3 Circuits/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Predictable faults are confirmed by following routine testing procedures.
- 2.5 Apparatus is dismantled in accordance with manufacturer's service guide and supervisor's instructions.
- 2.6 Component parts are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage.
- 2.7 Repairs are made in accordance with manufacturer's service guide and supervisor's instructions.
- 2.8 Apparatus is assembled in an appropriate sequence with all components parts placed, secured and connected in accordance with manufacturer's guide or industry practice.
- 2.9 Repaired equipment is test in accordance with routine procedures to verify that it functions correctly.
- 2.10 Procedures for referring non-routine events to immediate supervisor for directions are followed.
- 2.11 Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report repair work activities.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work area is cleaned and made safe in accordance with established procedures.
  - 3.3 Equipment is place into service and customer and work supervisor notified of the completion of the repair work in accordance with routine procedures.
  - 3.4 Service report is complete in accordance with routine procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out routine repairs to business equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.1.8	Electronic cable and conductor terminations
2.2.1	Enterprise communication methods
2.4.18	Business equipment software basics
2.9.73	Operational concepts of business machines
2.9.74.1	Electro-mechanics of business machines
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by confirming at least four predictable faults in low volume (up to 40 ppm) photocopiers and following routine procedures to repair such faults.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must

include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling

employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out routine repairs to business equipment as described in 7) and including:
    - A Following service instructions to confirm reported fault.
    - B Following service instructions to access components.
    - C Removing and replace mechanical components.
    - D Removing and replace electrical/electronic components.
    - E Reassembling the business equipment correctly.
    - F Testing equipment operation.
    - G Completing service report accurately.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out routine repairs to business equipment.

**Method of**

**8.4)**

**assessment**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEE001A Use basic computer applications relevant to a workplace
- UEENEE002A Dismantle, assemble and fabricate electro technology components
- UEENEE007A Use drawings, diagrams, schedules and manuals
- UEENEE002A Carry out basic repairs to electronic equipment

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: NA	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.9	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.4 to 2.9
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.10
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## UEENEEH004A Set up and test residential audio/video equipment

### Unit Descriptor

1)

This unit covers setting-up of non-fixed audio and video equipment as directed in user manuals in a residential or business environment. It encompasses safe working practices, connection and secure and optimum placement of system components, following written and oral instruction and procedures and customer relations.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies to this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

#### Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<b>5) Elements describe the essential outcomes of a unit of competency</b>	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to set up audio/video equipment.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards that have not previously been identified are reported and advise on risk control measures are sought from the work supervisor.</p> <p>1.4 Details of the system are obtained from purchase documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.5 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.</p> <p>1.6 Materials that may be required for the work are obtained and checked in accordance with routines and procedures.</p> <p>1.7 Tools and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Set up audio/video equipment.	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits/components are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.4 System components are unpacked to ensure they are complete and undamaged.</p>

- |   |                                    |  |   |
|---|------------------------------------|--|---|
|   | 2.5                                | System components are placed for optimum performance within constraints imposed by the area and customer.  |   |
|   | 2.6                                | Systems components are connected in accordance with manufacturer's instructions.   |   |
|   | 2.7                                | System functions are set to customer's requirements and tested for correct operation.  |   |
|   | 2.8                                | Procedures for referring non-routine events to immediate supervisor for directions are followed.   |   |
|   | 2.9                                | System set up is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |   |
| 3 | Complete system set up and report. | 3.1  | OHS risk control work completion measures and procedures are followed.                            |
|   |                                    | 3.2  | Work area is cleaned and made safe in accordance with established routines.                       |
|   |                                    | 3.3  | All system/component documentation is handed over to the customer.                                |
|   |                                    | 3.4  | Work supervisor is notified of the completion of the work in accordance with established routine. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out routine repairs to business equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |        |   |
|--|--------|---|
|  | 2.1.8  | Electronic cable and conductor terminations   |
|  | 2.9.15 | Audio and video component functional controls |
|  | 2.9.42 | Audio and video system set up                 |
|  | 2.18.1 | Occupational Health and Safety principles     |
|  | 2.18.9 | Electronic Safe working practices             |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by assembling, setting up and functional testing:

- An audio system consisting of a pair of speakers, a preamplifier/power amplifier or an integrated amplifier, tuner and compact disk player, and
- An audio/video system consisting of television receiver, 5-channel amplifier, five speakers and a digital versatile disk player.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently

practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out routine repairs to business equipment as described in 7) and including:
    - A Unpacking and checking system components against purchase documents and manufacturer's content list.
    - B Placing components for optimum performance within constraints imposed by the area and customer.
    - C Connecting components to manufacturer's instructions.
    - D Setting functional controls to customer's requirements.

- E Testing functional operation.
- F Completing necessary documentation, including handing over all system/component documents to the customer.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out routine repairs to business equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: NA	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.7	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.6; 2.7	
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## UEENEEH005A **Verify compliance and functionality of custom electronic installations**

### Unit Descriptor

1)

This unit covers testing and visual inspection for verifying that a custom electronic system and components are safe and comply with requirements and functions as intended. It encompasses working safely, conducting compliance tests, conducting visual inspections, identifying non-compliance defects and mandatory reporting requirements.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH006A Assemble and set up fixed audio/video components and systems in buildings and premises

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Where the components of the custom electronic system are connected to the public telephone system facility practice in the workplace is also subject to ACA regulations to undertake cabling work.

Note:

Units ‘UEE NEEF001A and UEE NEEF002A provide the required skill and knowledge for registration in accordance with ACA regulations for undertaking cabling work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to verify custom electronic installations.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
- 1.4 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.5 Location of system components is determined from specifications and diagrams.
- 1.6 Inspection and tests are appropriately sequenced in accordance with job schedule.
- 1.7 Materials needed for the tests and verification are obtained in accordance with established procedures and checked against job requirements.
- 1.8 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety.

Visually inspect the installation.

2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.3 Cabling is checked for appropriate type and size.
  - 2.4 Cabling, accessories and components are validated as being suitably located, securely fixed and suitably protected from damage or corrosion.
  - 2.5 Accessories and components are validated as being appropriately rated and meeting functional requirements.
  - 2.6 Evidence that equipment complies with safety and functional requirements is cited.
  - 2.7 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
  - 2.8 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.9 Inspection is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 2 Conduct tests.
- 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Testing or measuring on a live and operating system in strict accordance with OHS requirements and within established safety procedures.
  - 3.3 Circuits/machines/plant are checked as being isolated in strict accordance OHS requirements and procedures.
  - 3.4 Tests are conducted to verify that the cabling is safe and meets specified standards and any applicable regulatory requirements.
  - 3.5 Custom electronic apparatus and devices are tested to ensure the installation is safe and functions as intended.
  - 3.6 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
  - 3.7 Unexpected situations are dealt with safely and with the approval of an authorised person.

	3.8	Testing is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
4	Report inspection and verification findings.	4.1 OHS work completion risk control measures and procedures are followed.
	4.2	Work site and equipment is cleaned and made safe in accordance with established procedures.
	4.3	Non-compliance defects are identified and reported in accordance with established procedures.
	4.4	Recommendations for rectifying defects are made in accordance with established procedures.
	4.5	Work completion is documented and an appropriate person(s) notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying compliance and functionality of custom electronic installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.72	Custom electronic installations, testing and verification methods
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to at least two different new or existing custom electronic installations. One installation shall include a basic integrated system. Verification shall include the following

- Visual inspection of cabling, accessories and apparatus and controls
- Conducting all safety and compliance tests

Note:

1. Testing includes isolation testing; insulation resistance; cable tests to specified standard (e.g. Category 5 standard); polarity tests; continuity of earthing; correct connections performance tests.
2. Electrical testing may be limited by the scope permitted under restricted electrical work

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Verify compliance and functionality of custom electronic installations as described in 7) and including:
    - A Identifying visual defects.
    - B Conducting all tests safely and correctly.
    - C Identifying non-compliant defects from test results.
    - D Recommending appropriate corrective actions.
    - E Acting within regulatory limits.
    - F Reporting legibly and accurately.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and 8.3)**

**specific resources for assessment**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in verifying compliance and functionality of custom electronic installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.5; 1.6; 2.3 to 2.6; 3.4; 3.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 3.4; 3.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  4.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  3.4; 3.5	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	4.3 to 4.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.8; 2.1; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 2.8; 3.7; 3.8

## **UEENEEH006A Assemble and set up fixed audio/video components and systems in buildings and premises**

### **Unit Descriptor**

1)

This unit covers installing of fixed audio/video components and systems in a residential or business environment. It encompasses safe working practices; secure placement and connection of system components, following written and oral instruction and procedures and customer relations.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEEE008A Lay wiring and terminate accessories for extra-low voltage circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical

apparatus and site rehabilitation.  
 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to install audio/video components and systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines.
- 1.2 Established OHS risk control measures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are reported and advise on risk control measures, are sought from the work supervisor.
- 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor and/or other appropriate person to ensure the work is co-ordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established routines.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Install audio/video components and systems.

- 2.1 Established OHS risk control measures for carrying out the work are followed.
- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.3 Audio/video components are installed to comply standards and job specifications with sufficient excess to affect terminations.
- 2.4 Accessories are installed straight and square in the required locations and within acceptable tolerances.

- |   |  |  |   |
|---|--|--|---|
|   | 2.5                                    | Cables and conductors are terminated at accessories in accordance with manufacture’s specifications and regulatory requirements  |   |
|   | 2.6                                    | Procedures for referring non-routine events to immediate supervisor for directions are followed.   |   |
|   | 2.7                                    | The installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices. |   |
| 3 | Complete installation work and report. | 3.1  | OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2  | Work site is cleaned and made safe in accordance with established procedures.                                   |
|   |  | 3.3  | Work supervisor is notified of the completion of the installation work in accordance with established routines. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and assembling and setting up fixed audio/video components and systems in buildings and premises. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |   |
|--|----------|---|
|  | 2.5.5    | Technical standards, regulations and codes for extra low voltage work |
|  | 2.9.16.1 | Sound reproduction fundamentals                                       |
|  | 2.9.17.1 | Audio reproduction, electronic components                             |
|  | 2.9.18   | Audio reproduction, speaker fundamentals                              |
|  | 2.9.19   | Audio/video recording and replay components repair basics             |
|  | 2.9.43   | Video systems installation  |
|  | 2.9.81   | Audio/video control equipment   |
|  | 2.18.1   | Occupational Health and Safety principles                             |
|  | 2.18.9   | Electronic Safe working practices                                     |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by assembling and setting up fixed audio/video systems in building and premises on at least two occasions. Systems are to consist of surround sound and multi-room speakers, central audio and home theatre components.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for

Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble and set up fixed audio/video components and systems in buildings and premises as described in 7) and including:
    - A Reading and interpreting drawings of circuit arrangements and component locations.
    - B Placing and securing components and accessories accurately.
    - C Maintaining fire integrity.
    - D Terminating cable and conductors correctly.
    - E Connecting components to manufacturer's instructions.
    - F Setting functional controls to customer's

requirements.

- G Testing functional operation.
- H Completing necessary documentation including handing over all system/component documents to the customer.
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling and setting up fixed audio/video components and systems in buildings and premises.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE002A Dismantle, assemble and fabricate electro technology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, schedules and service manuals

UEENEEE008A Lay wiring and terminate accessories for extra-low voltage circuits

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.6

## **UEENEEH007A Carry out repairs of predictable faults in general electronic apparatus**

### **Unit Descriptor**

**1)**

This unit covers identifying predictable faults and repairing by replacement of subassemblies in electronic apparatus. The unit encompasses safe working practices, interpreting circuit diagrams and service manuals, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A Solve problems in digital components of electronic apparatus

UEENEEH013A Solve problems in amplifier sections of electronic apparatus

UEENEEH038A Find and repair faults in complex power supplies

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical

work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to repair electronic apparatus.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment, testing devices and service manual needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Fault finding is approached methodically drawing on knowledge of electronic apparatus and circuit using measured and calculated values of apparatus parameters and/or with reference to manufacturer's service manual.
- 2.5 Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.
- 2.6 Faulty components are rechecked and their fault status confirmed.
- 2.7 Repairs are made in accordance with manufacturer's service guide and supervisor's instructions.
- 2.8 Apparatus is reassembled and tested for safety and functionality in preparation for return to the customer.
- 2.9 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.10 Repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report repair activities.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work area is cleaned and made safe in accordance with established procedures.
  - 3.3 Written justification is made for repairs to apparatus.
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out repairs of predictable faults in general electronic apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.10	Technical manuals and catalogues
2.9.83	General electronic apparatus repair basics
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out repairs of predictable faults in two different general electronic apparatus.

Note.

Examples of general electronic apparatus are data capture devices, security panels, fire protection panels, industrial control apparatus, instrumentation electronics and the like.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the

workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out repairs of predictable faults in general electronic apparatus in buildings and premises as described in 7) and including:
    - A Using methodical fault finding techniques.
    - B Finding faults efficiently.
    - C Replacing components without damage.
    - D Providing written justification for the repairs.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out repairs of predictable faults in general electronic apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEH002A Carry out basic repairs to electronic apparatus by replacement of components
- UEENEEH011A Solve problems in d.c. power supplies with single phase input
- UEENEEH012A Solve problems in digital components of electronic apparatus
- UEENEEH015A Solve problems in microprocessor based hardware and firmware
- UEENEEH039A Solve problems in basic amplifier circuits

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.6; 3.3
4	Interacting and understanding of	Refer to the following Performance Criteria for examples of application:

	the context of the work task	2.1 to 2.10
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9

## **UEENEEH008A Assemble and erect reception antennae and signal distribution equipment**

### **Unit Descriptor**

1)

This unit covers the installation, positioning and securing of terrestrial and satellite arrays and dishes and associated amplifiers and the reticulation of cables and connection of multiple access outlets and associated equipment. It encompasses safe working practices, selection of antennae and distribution components, installation techniques, use of testing devices and following written and oral instruction and procedures.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electro technology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, schedules and service manuals

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to install and set-up reception antennae and signal distribution systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines.
- 1.2 Established OHS risk control measures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are reported and advise on risk control measures, are sought from the work supervisor.
- 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor and/or other appropriate person to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established routines.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

- |   |   |     |  |
|---|---|-----|--|
| 2 | Install reception antennae and signal distribution systems.           | 2.1 | Established OHS risk control measures for carrying out the work are followed.  |
|   |   | 2.2 | Circuits/components are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |
|   |   | 2.3 | The optimum location for an antenna to be installed is determine from signal tests and limitation imposed by the customer and regulation.                                      |
|   |   | 2.4 | Accessories are installed straight and square in the required locations and within acceptable tolerances.  |
|   |   | 2.5 | Cables and conductors are terminated at accessories in accordance with manufacture’s specifications and regulatory requirements.   |
|   |   | 2.6 | Procedures for referring non-routine events to immediate supervisor for directions are followed.   |
|   |   | 2.7 | The installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices. |
| 3 | Set-up reception antennae and signal distribution systems and report. | 3.1 | OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2 | Adjustments are made to the antenna and the system to optimise reception at each outlet.   |
|   |   | 3.3 | Work site is cleaned and made safe in accordance with established procedures.  |
|   |   | 3.4 | Work supervisor is notified of the completion of the installation work in accordance with established routines.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and assembling and erecting reception antennae and signal distribution equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.1.7.2 | Coaxial cable installation and terminations |
| 2.10.14 | TV antenna systems                          |
| 2.10.15 | Antenna installation and servicing          |

2.18.1 Occupational Health and Safety principles

2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by installing, connecting and setting up reception antennae and signal distribution systems on at least two occasions. Systems are to consist of multiple outlets for multiple users.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions

about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble and erect reception antennae and signal distribution equipment as described in 7) and including:
    - A Reading and interpreting drawings of circuit arrangements and component locations.
    - B Placing and securing antenna and accessories accurately.
    - C Maintaining fire integrity.
    - D Terminating cable and conductors correctly.

- E Adjusting for optimum reception at each outlet.
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling and erecting reception antennae and signal distribution equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE002A Dismantle, assemble and fabricate electro technology components
- UEENEEE005A Fix and secure equipment
- UEENEEE007A Use drawings, schedules and service manuals
- UEENEEE008A Install wiring and accessories for extra-low voltage circuits

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEH009A Set up and test gaming/games equipment**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers setting-up of electronic gaming and games equipment to manufactures’ instructions in compliance with regulations. It encompasses safe working practices, connection and secure placement of gaming/games equipment, following written and oral instruction and procedures and customer relations.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite competencies to this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also be used to augment previously acquired competencies.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, access to gaming premises and where applicable contracts of training such as apprenticeships.</p> <p>Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.</li> </ol>						



- |   |                                    |   |
|---|------------------------------------|---|
|   | 2.5                                | Equipment operating functions are set to regulatory and customer requirements and tested for correct operation.   |
|   | 2.6                                | Procedures for referring non-routine events to immediate supervisor for directions are followed.  |
|   | 2.7                                | Equipment set up is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Complete system set up and report. | 3.1 OHS risk control work completion measures and procedures are followed.  |
|   |                                    | 3.2 Work area is cleaned and made safe in accordance with established routines.   |
|   |                                    | 3.3 Documentation detailing equipment maintenance and operating instructions is handed over to the customer.  |
|   |                                    | 3.4 Work supervisor is notified of the completion of the work in accordance with established routine.   |

Note 1:

Connection of equipment may include both plug connected power supply and network

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and setting up and testing gaming/games equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.2.1    | Enterprise communication methods                                       |
| 2.2.5    | Enterprise customer relations protocols                                |
| 2.5.18   | Regulatory requirements and codes of practice for the gaming equipment |
| 2.9.22   | Gaming machine systems and equipment overview                          |
| 2.9.23.1 | Gaming machine equipment adjustment and maintenance                    |
| 2.18.1   | Occupational Health and Safety principles                              |
| 2.18.9   | Electronic Safe working practices                                      |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be in relation to setting up and testing a gaming machine connected to a network and a commercial games machine to customer and regulatory requirement.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up and test gaming/games equipment as described in 7) and including:
    - A Placing equipment in accordance with regulatory and customer requirements.
    - B Connecting equipment to manufacturer's instructions and regulatory and customer requirements.
    - C Setting functional controls to regulatory and customer's requirements.
    - D Testing functional operation.
    - E Completing necessary documentation including handing over equipment maintenance and operating instructions documents to the customer.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up and testing gaming/games equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: NA	

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5	

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.3

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

# UEENEEH010A Install commercial audio/video system components

## Unit Descriptor

1)

This unit covers installation of components for audio/video facilities in buildings and premises. The unit encompasses working safely and to specifications and standards, matching equipment with that specified for a given location, terminating and interconnecting cables/conductors and completing the necessary installation documentation.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electro technology components.

UEENEEE005A Fix and secure equipment.

UEENEEE007A Use drawings, schedules and service manuals.

UEENEEE008A Lay cables and terminate accessories for extra-low voltage circuits.

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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## Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

## Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to install audio/video components and systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines.
- 1.2 Established OHS risk control measures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are reported and advise on risk control measures, are sought from the work supervisor.
- 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor and/or other appropriate person to ensure the work is co-ordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established routines.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2	Install audio/video components and systems.	2.1	Established OHS risk control measures for carrying out the work are followed.
		2.2	Circuits/components are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		2.3	Audio/video components are installed to comply standards and job specifications with sufficient excess to affect terminations.
		2.4	Accessories are installed straight and square in the required locations and within acceptable tolerances.
		2.5	Cables and conductors are terminated at accessories in accordance with manufacture’s specifications and regulatory requirements.
		2.6	Procedures for referring non-routine events to immediate supervisor for directions are followed.
		2.7	The installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
3	Complete installation work and report.	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Work supervisor is notified of the completion of the installation work in accordance with established routines.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing commercial audio/video system components. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.1.7.4	Specialist audio/video cabling installation and termination
2.5.5	Technical standards, regulations and codes for extra-low voltage work
2.9.17.1	Audio reproduction, electronic components

- 2.9.16.1 Sound reproduction fundamentals
- 2.9.18 Audio reproduction, speaker fundamentals
- 2.9.19 Audio/video recording and replay components repair basics
- 2.9.46 Professional audio electronics.
- 2.9.47 Loud speakers and microphones
- 2.9.80 Video and display set up
- 2.9.81 Audio/video control equipment
- 2.18.1 Occupational Health and Safety principles.
- 2.18.9 Electronic Safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installing and connecting commercial audio/video system components in buildings and premises on at least two occasions.

Note:

Examples of systems are dedicated audio and video facilities in meeting rooms, video conferencing facilities, centrally controlled audio/video facilities across a number of locations.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in

some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install commercial audio/video system components as described in 7) and including:
    - A Reading and interpreting drawings of system arrangements and component locations.
    - B Placing and securing components and accessories accurately.
    - C Maintaining fire integrity.
    - D Connecting apparatus and associated components to comply with requirements.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing commercial audio/video system components.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the

industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE002A Dismantle, assemble and fabricate electro technology components
- UEENEEE005A Fix and secure equipment
- UEENEEE007A Use drawings, schedules and service manuals
- UEENEEE008A Install wiring and accessories for extra-low voltage circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.1; 1.2	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEH011A      Solve problems in d.c. power supplies with single phase input**

### **Unit Descriptor**

**1)**

This unit covers determining correct operation of independent power supplies and power supply sections of electronic apparatus. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in d.c. power supplies with single phases input.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH001A      Carry out basic repairs to computer equipment by replacement of modules/sub-assemblies

OR

UEENEEH002A      Carry out basic repairs to electronic apparatus by replacement of components

AND

UEENEEH014A      Solve problems in frequency dependent circuits

OR

UEENEEG002A      Solve problems in single and three phase low voltage circuits

OR

UEENEEG012A      Solve fundamental problems in electrical systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

**Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also be used to augment formally acquired competencies.

**Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field**

4)

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on d.c. power supplies.

- 1.1 OHS procedures for a given work area are obtained and understood.
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the power supply problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
  - 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
  - 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
- 2 Solve d.c. power supply problems.
- 2.1 OHS risk control work measures and procedures are followed.
  - 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
  - 2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Established methods are used to solve problems from measure and calculated values as they apply to d.c. power supplies with single phase input.
  - 2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.6 Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Complete work and document problem solving activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Justification for solutions used to solve circuit problems is documented.
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in d.c. power supplies with single phase input. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.12	Electronic fault finding
2.9.63	Direct current power supplies
2.11.7.2	Advanced electronic testing and measuring devices and techniques
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving problems in d.c. power supplies with single phase input on the rectification section and filtering section of a half wave bridge rectifier and a full wave bridge rectifier.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in

a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in d.c. power supplies with single phase input as described in 7) and including:
    - A Using methodical problem solving methods.
    - B Taking measurements correctly and accurately.
    - C Calculating parameters correctly and accurately.
    - D Providing solution to power supply problems, and
    - E Providing written justification for the solutions to problems.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in d.c. power supplies with single phase input

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which

is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	1
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH012A Solve problems in digital components of electronic apparatus

### Unit Descriptor

1)

This unit covers determining correct operation of digital components of electronic apparatus. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in digital components circuits.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH001A Carry out basic repairs to computer equipment by replacement of modules/sub-assemblies

OR

UEENEEH002A Carry out basic repairs to electronic apparatus by replacement of components

OR

UEENEEH070A Terminate and connect components, conductors, wiring and cables for electronic circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on digital component.

- 1.1 OHS procedures for a given work area are obtained and understood.
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the digital component/circuit problems is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

- |   |  |     |  |
|---|--|-----|--|
| 2 | Solve digital components problems.                     | 2.1 | OHS risk control work measures and procedures are followed.  |
|   |  | 2.2 | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures. |
|   |  | 2.3 | Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.   |
|   |  | 2.4 | Established methods are used to solve problems from measure and calculated values as they apply to digital components in an electronic apparatus.            |
|   |  | 2.5 | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   |  | 2.6 | Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.       |
| 3 | Complete work and document problem solving activities. | 3.1 | OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3 | Justification for solutions used to solve circuit problems is documented.  |
|   |  | 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures.                                       |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in d.c. power supplies with single phase input. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.4.1 Digital electronic fundamentals
- 2.9.12 Electronic fault finding
- 2.11.7.1 Electronic testing and measuring devices and techniques
- 2.18.1 Occupational Health and Safety principles

## 2.18.9 Electronic Safe working practices

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving at least two of the following types basic digital component/ circuit problems.

- Determining the operating parameters of a digital component of an existing circuit
- Alternating an existing digital component to comply with specified operating parameters
- Developing a basic digital component to comply with a specified function and operating parameters
- Finding and repairing a fault in a digital component of an existing circuit

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment****8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access

to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in d.c. power supplies with single phase input as described in 7) and including:

- A Using methodical problem solving methods.
- B Taking measurements correctly and accurately.
- C Calculating parameters correctly and accurately.
- D Providing solution to digital component/circuit problems.
- E Providing written justification for the solutions to problems.
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in d.c. power supplies with single phase input

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEH002A Carry out basic repairs to electronic equipment
- UEENEEH012A Find and repair faults in the digital components in electronic apparatus
- UEENEEH015A Solve problems in microprocessor based hardware and firmware
- UEENEEH016A Find and repair faults in the microwave amplifier sections in electronic apparatus
- UEENEEH039A Solve problems in basic amplifier circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH013A Solve problems in amplifier sections of electronic apparatus

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers determining correct operation of discrete component amplifier sections of electronic apparatus. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in amplifier sections/circuits.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit may be assessed with or only after the following competency has been confirmed.</p> <p>UEENEEH039A Solve problems in basic amplifier circuits</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td>Reading</td> <td style="text-align: center;">3</td> <td>Writing</td> <td style="text-align: center;">3</td> <td>Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies..</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.</p> <p>Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as</p>						

apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on amplifier sections.

1.1 OHS procedures for a given work area are obtained and understood.

1.2 OHS risk control work preparation measures and procedures are followed.

1.3 The nature of amplifier problems is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.

1.5 Sources of materials that may be required for the work are established in accordance with established procedures.

1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve amplifier section problems.

2.1 OHS risk control work measures and procedures are followed.

2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |  |  |
|---|--|--|
|   | 2.4  | Established methods are used to solve problems from measure and calculated values as they apply to amplifier sections in an electronic apparatus.      |
|   | 2.5  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   | 2.6  | Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices. |
| 3 | Complete work and document problem solving activities. |  |
|   | 3.1  | OHS work completion risk control measures and procedures are followed.   |
|   | 3.2  | Work site is cleaned and made safe in accordance with established procedures.  |
|   | 3.3  | Justification for solutions used to solve circuit problems is documented.  |
|   | 3.4  | Work completion is documented and an appropriate person or persons notified in accordance with established procedures.                                 |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in amplifier sections of electronic apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.9.9.1  | Advanced amplifiers  |
| 2.9.9.2  | Amplifier applications   |
| 2.11.7.2 | Advanced electronic testing and measuring devices and techniques |
| 2.18.1   | Occupational Health and Safety principles                        |
| 2.18.9   | Electronic Safe working practices                                |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving at least two of the following types amplifier problems.

- Determining the operating parameters of an amplifier section of an electronic apparatus.

- Alternating an existing amplifier section to comply with specified operating parameters
- Developing an amplifier section to comply with a specified function and operating parameters
- Finding and repairing a fault in an amplifier section of an electronic apparatus

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when

choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in amplifier sections of electronic apparatus as described in 7) and including:
    - A Using methodical problem solving methods.
    - B Taking measurements correctly and accurately.
    - C Calculating parameters correctly and accurately.
    - D Providing solution to digital component/circuit problems.
    - E Providing written justification for the solutions to problems.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in amplifier sections of electronic apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH002A	Carry out basic repairs to electronic equipment
UEENEEH012A	Find and repair faults in the digital components in electronic apparatus
UEENEEH014A	Solve problems in resonance circuits
UEENEEH015A	Solve problems in microprocessor based hardware and firmware

UEENEEH016A Find and repair faults in the microwave amplifier sections in electronic apparatus

UEENEEH039A Solve problems in basic amplifier circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:	

	2.4	1
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH014A Solve problems in frequency dependent circuits

### Unit Descriptor

1)

This unit covers determining correct operation of resonance circuits used in electronic apparatus. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in resonance circuits.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEEE004A Solve problems in multiple path d.c. circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also be used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on resonance circuits.

1.1 OHS procedures for a given work area are obtained and understood.

1.2 OHS risk control work preparation measures and procedures are followed.

1.3 The nature of the amplifier circuit problems is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.

1.5 Sources of materials that may be required for the work are established in accordance with established procedures.

1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve in resonance circuits.

2.1 OHS risk control work measures and procedures are followed.

2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |  |  |  |
|---|--|--|--|
|   | 2.4  | Established methods are used to solve problems from measure and calculated values as they apply to resonance circuits.                                 |  |
|   | 2.5  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |  |
|   | 2.6  | Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices. |  |
| 3 | Complete work and document problem solving activities. | 3.1  | OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2  | Work site is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3  | Justification for solutions used to solve circuit problems is documented.  |
|   |  | 3.4  | Work completion is documented and an appropriate person or persons notified in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in amplifier sections of electronic apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.9.1.4  | Frequency dependent circuit principles                  |
| 2.11.7.1 | Electronic testing and measuring devices and techniques |
| 2.18.1   | Occupational Health and Safety principles               |
| 2.18.9   | Electronic Safe working practices                       |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving at least two of the following types resonance circuit problems.

- Determining the operating parameters of an existing circuit
- Alternating an existing circuit to comply with specified operating parameters

- Developing circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in amplifier sections of electronic apparatus as described in 7) and including:
    - A Using methodical problem solving methods.
    - B Taking measurements correctly and accurately.
    - C Calculating parameters correctly and accurately.
    - D Providing solution to resonance circuit problems.
    - E Providing written justification for the solutions to problems.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in amplifier sections of electronic apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE004A      Solve problems in multiple path d.d. circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH015A Solve problems in microprocessor based hardware and firmware

### Unit Descriptor

1)

This unit covers determining correct operation of microprocessor hardware and firmware. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in microprocessor hardware and firmware.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH002A Carry out basic repairs to electronic apparatus by replacement of components

OR

UEENEEH001A Carry out basic repairs to computer equipment by replacement of modules/sub-assemblies

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some

States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on microprocessor hardware and firmware.

1.1 OHS procedures for a given work area are obtained and understood.

1.2 OHS risk control work preparation measures and procedures are followed.

1.3 The nature of microprocessor hardware and firmware problems is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.

1.5 Sources of materials that may be required for the work are established in accordance with established procedures.

1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve microprocessor hardware and firmware

2.1 OHS risk control work measures and procedures are followed.

- |  |     |   |
|--|-----|---|
| \ problems.  | 2.2 | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.        |
|  | 2.3 | Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |
|  | 2.4 | Established methods are used to solve problems from measure and calculated values as they apply to microprocessor hardware and firmware in an electronic apparatus. |
|  | 2.5 | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|  | 2.6 | Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.              |
| 3 Complete work and document problem solving activities. | 3.1 | OHS work completion risk control measures and procedures are followed.  |
|  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.   |
|  | 3.3 | Justification for solutions used to solve circuit problems is documented.   |
|  | 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in microprocessor based hardware and firmware. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.9.5.1  | Microprocessor fundamentals                                      |
| 2.9.12   | Electronic fault finding   |
| 2.11.7.1 | Electronic testing and measuring devices and techniques          |
| 2.11.7.2 | Advanced electronic testing and measuring devices and techniques |
| 2.18.1   | Occupational Health and Safety principles                        |

## 2.18.9 Electronic Safe working practices

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving at least two of the following types microprocessor hardware and firmware problems:

- Determining the operating parameters of microprocessor hardware and firmware of an electronic apparatus
- Alternating an existing microprocessor hardware and firmware to comply with specified operating parameters
- Developing microprocessor based hardware and firmware to comply with a specified function and operating parameters
- Finding and repairing a basic fault in microprocessor hardware and firmware of an electronic apparatus

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment****8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access

to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in microprocessor based hardware and firmware as described in 7) and including:

- A Using methodical problem solving methods.
- B Taking measurements correctly and accurately.
- C Calculating parameters correctly and accurately.
- D Providing solution to digital component/circuit problems.
- E Providing written justification for the solutions to problems.
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in microprocessor based hardware and firmware.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEH012A Find and repair faults in the digital components in electronic apparatus
- UEENEEH013A Find and repair faults in the amplifier sections of electronic apparatus
- UEENEEH014A Solve problems in resonance circuits
- UEENEEH016A Find and repair faults in the microwave amplifier sections in electronic apparatus
- UEENEEH039A Solve problems in basic amplifier circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

AND

- UEENEEH002A Carry out basic repairs to electronic equipment

OR

- UEENEEH001A Carry out basic repairs to computer equipment by replacement of modules/sub-assemblies

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3; 3.4
4	Interacting and understanding of	Refer to the following Performance Criteria for examples of application:

	the context of the work task	1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## **UEENEEH016A Find and repair faults in the microwave amplifier sections in electronic apparatus**

### **Unit Descriptor**

1)

This unit covers fault finding and repair of microwave amplifier sections in electronic apparatus. The unit encompasses safe working practices, interpreting circuit diagrams, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH046A Solve fundamental problems in electronic communication systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as

apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults.

1.1 OHS procedures for a given work area are identified, obtained and understood.

1.2 OHS risk control measures and procedures are followed in preparation for the work.

1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.

1.5 Sources of materials that may be required for the work are established in accordance with established procedures.

1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find faults.

2.1 OHS risk control measures and procedures for carrying out the work are followed.

2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Fault finding is approached methodically drawing on knowledge of microwave amplifier sections and circuit using measured and calculated values of apparatus parameters.
  - 2.5 Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.6 Faulty components are rechecked and their fault status confirmed.
  - 2.7 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.8 Fault finding activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Repair fault.
- 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 3.3 Materials required for the repair work are sourced and obtained in accordance with established procedures.
  - 3.4 Repairs are affected efficiently without damage to other components, apparatus or circuits.
  - 3.5 Effectiveness of the repair is tested in accordance with established procedures.
  - 3.6 Apparatus is reassembled, finally tested and prepared for return to customer.
- 4 Completion and report repair activities.
- 4.1 OHS work completion risk control measures and procedures are followed.
  - 4.2 Work area is cleaned and made safe in accordance with established procedures.
  - 4.3 Written justification is made for repairs to apparatus.

- 4.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in the microwave amplifier sections in electronic apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.9.3 Microwave amplifiers
- 2.9.12 Electronic fault finding
- 2.11.7.1 Electronic testing and measuring devices and techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing faults in the microwave amplifier sections in at least two types of electronic apparatus.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in the microwave amplifier sections in electronic apparatus as described in 7) and including:
    - A Using methodical fault finding techniques.
    - B Finding faults efficiently.
    - C Replacing components without damage.
    - D Providing written justification for the repairs.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in the microwave amplifier sections in electronic apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential

knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEH002A Carry out basic repairs to electronic equipment
- UEENEEH012A Find and repair faults in the digital components in electronic apparatus
- UEENEEH013A Find and repair faults in the amplifier sections of electronic apparatus
- UEENEEH014A Solve problems in resonance circuits
- UEENEEH015A Find and repair faults in the microprocessor components of electronic apparatus

The critical aspects of occupational health and safety covered in Unit UEENEEH001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this	Refer to the following Performance Criteria for examples of application:	

competency?	1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.6; 3.5; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the	Refer to the following Performance Criteria for examples of application:

	meaningful work task	1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEH017A Carry out repairs of predictable faults in audio and video replay/recording apparatus**

### **Unit Descriptor**

1)

This unit covers identifying predictable faults and repairing by replacement of subassemblies in CD, DVD and tape replay/recording apparatus. The unit encompasses safe working practices, interpreting circuit diagrams and service manuals, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A Solve problems in digital components of electronic apparatus

UEENEEH013A Solve problems in amplifier sections of electronic apparatus

UEENEEH038A Find and repair faults in complex power supplies

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also be used to augment formally acquired competencies.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c.

or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to repair replay/recording apparatus.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment, testing devices and service manual needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
  - 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Fault finding is approached methodically drawing on knowledge of replay/recording apparatus and circuit using measured and calculated values of apparatus parameters and/or with reference to manufacturer's service manual.
  - 2.5 Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.6 Faulty components are rechecked and their fault status confirmed.
  - 2.7 Repairs are made in accordance with manufacturer's service guide and supervisors instructions.
  - 2.8 Apparatus is reassembled and tested for safety and functionality in preparation for return to the customer.
  - 2.9 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.10 Repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report repair activities.
    - 3.1 OHS work completion risk control measures and procedures are followed.
    - 3.2 Work area is cleaned and made safe in accordance with established procedures.
    - 3.3 Written justification is made for repairs to apparatus.
    - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in the microwave amplifier sections in electronic apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.10	Technical manuals and catalogues
2.9.19	Audio/video recording and replay components repair basics
2.9.27	Digital versatile disc (DVD) and compact disc (CD)
2.9.48	Digital audio
2.9.52	Digital versatile disk processors
2.9.53	Compact disk players
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out repairs of at least four predictable faults in two different video replay/recording apparatus

Note.

Examples of audio/video recording and replay components are audiocassette player/recorders, compact disk players, videocassette player/recorder, digital versatile disk and super audio compact players.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships.

However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in the microwave amplifier sections in electronic apparatus as described in 7) and including:
    - A Using methodical fault finding techniques.
    - B Finding faults efficiently.
    - C Replacing components without damage.
    - D Providing written justification for the repairs.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in the microwave amplifier sections in electronic apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential

knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**  
Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.6	2
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.10
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9

# UEENEEH018A Find and repair faults in electronic apparatus

## Unit Descriptor

1)

This unit covers fault finding and repairing of general electronic apparatus. The unit encompasses safe working practices, consulting apparatus service manuals, interpreting circuit diagrams, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH007A Carry out repairs to predictable faults in general electronic apparatus

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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## Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

## Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |      |  |
|------|--|
| 2.4  | Fault finding is approached methodically drawing on knowledge of data circuits using measured and calculated values of apparatus parameters.   |
| 2.5  | Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage  |
| 2.6  | Faulty components are rechecked and their fault status confirmed.  |
| 2.7  | Effectiveness of the repair is tested in accordance with established procedures.   |
| 2.8  | Apparatus is reassembled, finally tested and prepared for return to customer.  |
| 2.9  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
| 2.10 | Fault finding activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3    | Completion and report repair activities.   |
| 3.1  | OHS work completion risk control measures and procedures are followed.   |
| 3.2  | Work area is cleaned and made safe in accordance with established procedures.  |
| 3.3  | Written justification is made for repairs to apparatus.  |
| 3.4  | Work completion is documented and an appropriate person or persons notified in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in electronic apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.9.70   | Automatic data capture                                     |
| 2.9.71.1 | Biometric devices  |
| 2.9.77   | Electronic components and systems, industrial applications |

2.18.1 Occupational Health and Safety principles

2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing four different faults in two different types of electronic apparatus.

Note.

Examples of electronic apparatus are communication-networking devices, data capture devices, fire protection panels, industrial control apparatus, instrumentation electronics, security panels, and the like.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in electronic apparatus as described in 7) and including:
    - A Using methodical fault finding techniques
    - B Finding faults efficiently
    - C Replacing components without damage
    - D Providing written justification for the repairs

- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in electronic apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.10
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9

## UEENEEH019A Carry out repairs of predictable faults in television receivers

### Unit Descriptor

1)

This unit covers identifying predictable faults and their repair by replacement of subassemblies in televisions. The unit encompasses safe working practices, interpreting circuit diagrams and service manuals, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A Solve problems in digital components of electronic apparatus

UEENEEH013A Solve problems in amplifier sections of electronic apparatus

UEENEEH038A Find and repair faults in complex power supplies

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical

work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to repair televisions.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment, testing devices and service manual needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
  - 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Fault finding is approached methodically drawing on knowledge of televisions and circuit using measured and calculated values of apparatus parameters and/or with reference to manufacturer's service manual.
  - 2.5 Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage
  - 2.6 Faulty components are rechecked and their fault status confirmed.
  - 2.7 Repairs are made in accordance with manufacturer's service guide and supervisor's instructions.
  - 2.8 Apparatus is reassembled and tested for safety and functionality in preparation for return to the customer.
  - 2.9 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.10 Repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report repair activities.
    - 3.1 OHS work completion risk control measures and procedures are followed.
    - 3.2 Work area is cleaned and made safe in accordance with established procedures.
    - 3.3 Written justification is made for repairs to apparatus.
    - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out repairs of predictable faults in television receivers. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.10	Technical manuals and catalogues
2.9.29	Television scanning and deflection
2.9.30	Television chrominance and luminance
2.9.57.1	Introduction to television
2.9.57.2	Television receiver repair basics
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic Safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out repairs to of at least four predictable faults in a CRT television receiver.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### **Overview of Assessment**

##### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out repairs of predictable faults in television receivers as detailed as described in 7) and including:
    - A Using methodical fault finding techniques.
    - B Finding faults efficiently.
    - C Replacing components without damage.
    - D Providing written justification for the repairs.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out repairs of predictable faults in television receivers.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling  
Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.10
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9

## **UEENEEH020A Find and repair faults in gaming and games equipment**

### **Unit Descriptor**

1)

This unit covers fault finding and repair of gaming equipment. The unit encompasses safe working practices, interpreting circuit diagrams, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH009A Set up and test gaming equipment

UEENEEH011A Solve problems in d.c. power supplies with single phase input

UEENEEH012A Find and repair faults in the digital components in electronic apparatus

UEENEEH013A Find and repair faults in the amplifier sections of electronic apparatus

UEENEEH038A Find and repair faults in complex power supplies

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |  |      |   |
|---|--|------|---|
| 2 | Find and repair faults.                                    | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |  | 2.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.  |
|   |  | 2.3  | Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |
|   |  | 2.4  | Fault finding is approached methodically drawing on knowledge of gaming equipment and circuit using measured and calculated values of apparatus parameters.   |
|   |  | 2.5  | Equipment components are dismantled where necessary and parts stored to protect them against loss or damage.  |
|   |  | 2.6  | Faulty components are rechecked and their fault status confirmed.   |
|   |  | 2.7  | Faulty components are readjusted or replace in accordance with established procedures.  |
|   |  | 2.8  | Effectiveness of the repaired component is tested in accordance with established procedures.  |
|   |  | 2.9  | Apparatus is reassembled, finally tested and prepared for return to customer.   |
|   |  | 2.10 | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |  | 2.11 | Fault finding and repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Completion and report fault finding and repair activities. | 3.1  | OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2  | Work area is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3  | Written justification is made for repairs to apparatus including components and materials used.   |
|   |  | 3.4  | Acceptance that the reported fault(s) have been repaired is sought from an appropriate person in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in gaming and games equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.19 Gaming equipment communications
- 2.9.23.2 Gaming machine fault finding
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing at least four faults in two different types of gaming equipment.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Find and repair faults in gaming and games equipment as detailed as described in 7) and including:
  - A Using methodical fault finding techniques.
  - B Finding faults efficiently.
  - C Replacing components without damage.
  - D Providing written justification for the repairs.
  - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in gaming and games equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH011A Find and repair faults in the power supplies of electronic apparatus

UEENEEH012A Find and repair faults in the digital components in electronic apparatus

UEENEEH013A Find and repair faults in the amplifier sections of electronic apparatus

UEENEEH015A Find and repair faults in the microprocessor components of electronic apparatus

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas	Refer to the following Performance Criteria for examples of application:	

and techniques used?	2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-	Refer to the following Performance Criteria for examples of application:

	routine or contingent situations	2.10
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## UEENEEH021A Find and repair faults in high volume office equipment

### Unit Descriptor

1)

This unit covers fault finding and repair in high volume photo copiers (40 to 80 ppm), fax machines and the like. The unit encompasses safe working practices, interpreting electrical and mechanical diagrams, applying knowledge of office equipment to logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH003A Carry out routine repairs to business equipment

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as

apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults.

1.1 OHS procedures for a given work area are identified, obtained and understood.

1.2 OHS risk control measures and procedures are followed in preparation for the work.

1.3 The nature of the fault is obtained from documentation, work supervisor and customer to establish the scope of work to be undertaken.

1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.

1.5 Sources of materials that may be required for the work are established in accordance with established procedures.

1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults.

2.1 OHS risk control measures and procedures for carrying out the work are followed.

2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Fault finding is approached methodically drawing on knowledge of office equipment and using measurements of operating parameters and built-in fault indicators referenced to manufacturer's specifications.
  - 2.5 Equipment components are dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.6 Faulty components are rechecked and their fault status confirmed.
  - 2.7 Faulty components are readjusted or replace in accordance with established procedures.
  - 2.8 Effectiveness of the repaired component is tested in accordance with established procedures.
  - 2.9 Apparatus is reassembled, finally tested and prepared for return to customer.
  - 2.10 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.11 Fault finding and repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault finding and repair activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work area is cleaned and made safe in accordance with established procedures.
  - 3.3 Written justification is made for repairs to apparatus including components and materials used.
  - 3.4 Acceptance that the reported fault(s) have been repaired is sought from an appropriate person in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in high volume office equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.45 Copier/printer software functions and configuration
- 2.9.74.2 Business machine transducers
- 2.9.75.1 High volume business machine functions and faults
- 2.9.75.2 Colour photocopiers operating principles
- 2.9.75.3 Facsimile machine operating principles
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by finding and repairing at least four faults in a high volume (40 to 80 ppm) copier and work group Fax machine (12 ppm).

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in

some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in high volume office equipment as detailed as described in 7) and including:
    - A Using methodical fault finding techniques.
    - B Finding faults efficiently.
    - C Remove/adjusting/replacing components without damage.
    - D Testing equipment operation.
    - E Providing written justification for the repairs and obtain acceptance of repairs.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in high volume office equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the

industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH012A Find and repair faults in the digital components in electronic apparatus

UEENEEH013A Find and repair faults in the amplifier sections of electronic apparatus

UEENEEH015A Find and repair faults in the microprocessor components of electronic apparatus

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.10
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## UEENEEH022A Find and repair faults in remote control apparatus

### Unit Descriptor

1)

This unit covers fault finding and repair in remote control apparatus and devices. The unit encompasses safe working practices, interpreting circuit diagrams, applying knowledge of remote control to logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A Solve problems in digital components of electronic apparatus

UEENEEH013A Solve problems in amplifier sections of electronic apparatus

UEENEEH038A Find and repair faults in complex power supplies

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical

work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation, work supervisor and customer to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- |   |  |   |  |
|---|--|---|--|
|   | 2.2  | Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |  |
|   | 2.3  | Fault finding is approached methodically drawing on knowledge of remote control apparatus using measured and calculated values of operating parameters and referenced to manufacturer's specifications. |  |
|   | 2.4  | Equipment components are dismantled where necessary and parts stored to protect them against loss or damage.  |  |
|   | 2.5  | Faulty components are rechecked and their fault status confirmed.   |  |
|   | 2.6  | Faulty components are readjusted or replace in accordance with established procedures.  |  |
|   | 2.7  | Effectiveness of the repaired component is tested in accordance with established procedures.  |  |
|   | 2.8  | Apparatus is reassembled, finally tested and prepared for return to customer.   |  |
|   | 2.9  | Unexpected situations are dealt with safely and with the approval of an authorised person.  |  |
|   | 2.10   | Fault finding and repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.   |  |
| 3 | Completion and report fault finding and repair activities. | 3.1   | OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2   | Work area is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3   | Written justification is made for repairs to apparatus including components and materials used.  |
|   |  | 3.4   | Acceptance that the reported fault(s) have been repaired is sought from an appropriate person in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in remote control apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.28 Hand held remote control units
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing at least four faults in two different types of remote control devices.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in remote control apparatus as detailed as described in 7) and including:
    - A Using methodical fault finding techniques.
    - B Finding faults efficiently.

- C Remove/adjusting/replacing components without damage.
- D Testing equipment operation.
- E Providing written justification for the repairs and obtain acceptance of repairs.
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing fault in remote control apparatus

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEH012A Find and repair faults in the digital components in electronic apparatus
- UEENEEH013A Find and repair faults in the amplifier sections of electronic apparatus
- UEENEEH015A Find and repair faults in the microprocessor components of electronic apparatus
- UEENEEH038A Find and repair faults in complex power supplies

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.10



## **UEENEEH023A Find and repair faults in microwave heating apparatus**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers fault finding and repair in remote control apparatus and devices. The unit encompasses safe working practices, interpreting circuit diagrams, applying knowledge of remote control to logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEH034A Document occupational risks in electronics</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0"> <tr> <td>Reading</td> <td>3</td> <td>Writing</td> <td>3</td> <td>Numeracy</td> <td>3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment previously acquired competencies.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.</p> <p>Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation, work supervisor and customer to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Fault finding is approached methodically drawing on knowledge of microwave heating apparatus using measured and calculated values of operating parameters and referenced to manufacturer's specifications.
  - 2.5 Equipment components are dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.6 Faulty components are rechecked and their fault status confirmed.
  - 2.7 Faulty components are readjusted or replaced in accordance with established procedures.
  - 2.8 Effectiveness of the repaired component is tested in accordance with established procedures.
  - 2.9 Apparatus is reassembled, finally tested and prepared for return to customer.
  - 2.10 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.11 Fault finding and repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault finding and repair activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work area is cleaned and made safe in accordance with established procedures.
  - 3.3 Written justification is made for repairs to apparatus including components and materials used.
  - 3.4 Acceptance that the reported fault(s) have been repaired is sought from an appropriate person in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in microwave heating apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.76 Microwave heating

- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing at least four faults in two different microwave heating devices.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its

‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in microwave heating apparatus as detailed as described in 7) and including:
    - A Using methodical fault finding techniques.
    - B Finding faults efficiently.
    - C Remove/adjusting/replacing components without damage.
    - D Testing equipment operation.
    - E Providing written justification for the repairs and

obtain acceptance of repairs.

- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in microwave heating apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH012A Find and repair faults in the digital components in electronic apparatus

UEENEEH013A Find and repair faults in the amplifier sections of electronic apparatus

UEENEEH015A Find and repair faults in the microprocessor components of electronic apparatus

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.10

## UEENEEH024A Carry out repairs of predictable faults in audio components

### Unit Descriptor

1)

This unit covers identifying predictable faults and repairing by replacement of subassemblies in audio components. The unit encompasses safe working practices, interpreting circuit diagrams and service manuals, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A Solve problems in digital components of electronic apparatus

UEENEEH013A Solve problems in amplifier sections of electronic apparatus

UEENEEH038A Find and repair faults in complex power supplies

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical

work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to repair audio components.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment, testing devices and service manual needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
  - 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Fault finding is approached methodically drawing on knowledge of audio components and circuit using measured and calculated values of apparatus parameters and/or with reference to manufacturer's service manual.
  - 2.5 Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.6 Faulty components are rechecked and their fault status confirmed.
  - 2.7 Repairs are made in accordance with manufacturer's service guide and supervisors instructions.
  - 2.8 Apparatus is reassembled and tested for safety and functionality in preparation for return to the customer.
  - 2.9 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.10 Repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report repair activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work area is cleaned and made safe in accordance with established procedures.
  - 3.3 Written justification is made for repairs to apparatus.
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out repairs of predictable faults in audio components. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.10	Technical manuals and catalogues
2.9.15	Audio and video component functional controls
2.9.17.1	Audio reproduction, electronic components
2.9.17.2	Audio component repair basics
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic Safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out repairs to two different audio components each with any three predictable faults.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### **Overview of Assessment**

##### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Carry out repairs of predictable faults in audio components as detailed as described in 7) and including:
  - A Using methodical fault finding techniques.
  - B Finding faults efficiently.
  - C Replacing components without damage.
  - D Providing written justification for the repairs.
  - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out repairs of predictable faults in audio components.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.6	2



## UEENEEH025A Provide solutions to single phase electronic power control problems

### Unit Descriptor

1)

This unit covers solving problems with electronic aspects of single phase power control devices and circuits. The unit encompasses safe working practices, interpreting diagrams, applying knowledge of electronic power control devices and their application, using effective problem solving techniques, safety and functional testing and reporting work activities and outcomes.

Note.

Typical single phase electronic power control problems are those encountered in meeting performance requirements and compliance standards, revising control operating parameters and dealing with control malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEH013A Solve problems in amplifier sections of electronic apparatus

OR

UEENEEH044A Diagnose and rectify faults in analogue circuits and components in electronic control systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to provide solutions to single phase electronic power control problems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of single phase electronic power control problem is determined from performance specifications and situation reports and in consultations with relevant persons.
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Provide solutions to single phase electronic

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

power control problems.	2.2	Knowledge of single phase electronic power control device and circuit operation, characteristics and applications are applied to developing solutions to control problems.
	2.3	Parameters, specifications and performance requirements in relation to each single phase electronic power control problem are obtained in accordance with established procedures.
	2.4	Approaches to resolving single phase electronic power control problems are evaluated to provide most effective solutions.
	2.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.6	Problems are solved efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
	3 Test and document solutions to single phase electronic power control.	3.1
3.2		Solutions to single phase electronic power control problems are tested to determine their effectiveness and modified where necessary.
3.3		Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed. (See Note)
3.4		Justification for solutions used to solve single phase electronic power control problems are documented in accordance with established procedures.

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions to single phase electronic power control problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.7 1 Single phase power control

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to providing solutions to at least four single phase electronic power control problems.

Note.

Typical single phase electronic power control problems are those encountered in meeting performance requirements and compliance standards, revising control operating parameters and dealing with control malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational

requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide solutions to single phase electronic power control problems as detailed as described in 7) and including:
    - A Understanding the extent of the single phase electronic power control problem.
    - B Obtaining electronic device and circuit parameters, specifications and performance requirements appropriate to each problem.
    - C Testing and solutions to single phase electronic power control problems.
    - D Documenting justification of solutions implemented in

accordance with established procedures.

- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing solutions to single phase electronic power control problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH013A Solve problems in amplifier sections of electronic apparatus

OR

UEENEEH044A Diagnose and rectify faults in analogue circuits and components in electronic control systems

The critical aspects of occupational health and safety covered in unit E001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3 to 2.4; 3.2	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.2	3

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.2 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH026A Provide solutions to polyphase electronic power control problems

### Unit Descriptor

1)

This unit covers solving problems with electronic aspects of polyphase power control devices and circuits. The unit encompasses safe working practices, interpreting diagrams, applying knowledge of electronic power control devices and their application, using effective problem solving techniques, safety and functional testing and reporting work activities and outcomes.

Note.

Typical polyphase electronic power control problems are those encountered in meeting performance requirements and compliance standards, revising control operating parameters and dealing with control malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH025A Provide solutions to single phase electronic power control problems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations

directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.</p>
<p>1 Prepare to provide solutions to polyphase electronic power control problems.</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of polyphase electronic power control problem is determined from performance specifications and situation reports and in consultations with relevant persons.</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
<p>2 Provide solutions to polyphase electronic power control problems.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of polyphase electronic power control device and circuit operation, characteristics and applications are applied to developing solutions to control problems.</p> <p>2.3 Parameters, specifications and performance requirements in relation to each polyphase electronic power control problem are obtained in accordance with established procedures.</p>

- |   |  |   |
|---|--|---|
|   | 2.4  | Approaches to resolving polyphase electronic power control problems are evaluated to provide most effective solutions.  |
|   | 2.5  | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|   | 2.6  | Problems are solved efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Test and document solutions to polyphase electronic power control. |   |
|   | 3.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   | 3.2  | Solutions to polyphase electronic power control problems are tested to determine their effectiveness and modified where necessary.                                    |
|   | 3.3  | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed. (See Note)                     |
|   | 3.4  | Justification for solutions used to solve polyphase electronic power control problems are documented in accordance with established procedures.                       |

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions to polyphase electronic power control problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.7 2 Polyphase power control

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to providing solutions to at least four polyphase electronic power control problems.

Note.

Typical polyphase electronic power control problems are those encountered in meeting performance

requirements and compliance standards, revising control operating parameters and dealing with control malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide solutions to polyphase electronic power control problems as described as described in 7) and including:
    - A Understanding the extent of the polyphase electronic power control problem.
    - B Obtaining electronic device and circuit parameters, specifications and performance requirements appropriate to each problem.
    - C Testing and solutions to polyphase electronic power control problems.
    - D Documenting justification of solutions implemented in accordance with established procedures.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing solutions to polyphase electronic power control problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH025A Provide solutions to single phase electronic power control problems

The critical aspects of occupational health and safety covered in unit E001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3 to 2.4; 3.2	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.2	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
1 Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.2 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH027A Commission commercial radio frequency (RF) transmission and reception systems

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the setting-up and adjusting of RF transmission and reception systems for optimum performance. It encompasses safe working practices, signal testing and analysis, adjusting equipment, following procedures and documenting.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEH072A Find and repair faults in the RF sections of electronic apparatus</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p> <p>Note:</p> <p>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power</p>						

operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to set-up process measuring instruments.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.5 Measurement parameters are identified by reviewing transmission/reception requirements and equipment manufacturers instructions.
- 1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.7 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements.
- 1.8 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 1.9 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |  |     |   |
|---|--|-----|---|
| 2 | Set-up process measuring instruments.    | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |  | 2.2 | Testing/measuring devices are connected and set up in accordance with requirements for a particular control system.   |
|   |  | 2.3 | Measuring instruments are set up and adjusted in accordance with transmission/reception requirements and equipment manufacturer’s instructions.                           |
|   |  | 2.4 | Adjustments are made to provide optimum transmission/reception performance within regulatory requirements.  |
|   |  | 2.5 | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.                              |
|   |  | 2.6 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|   |  | 2.7 | Setting-up is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles. |
| 3 | Completion and report set-up activities. | 3.1 | OHS risk control work completion measures and procedures are followed.  |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3 | Adjustment settings are documented and an appropriate person or persons notified in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and commissioning commercial radio frequency (RF) transmission and reception systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |  |
|---------|--|
| 2.10.9  | Electronic communications, antennas and wave propagation |
| 2.10.11 | Electronic communications, satellite                     |
| 2.10.19 | Electronic communications, commissioning                 |

process

2.18.1 Occupational Health and Safety principles

2.18.9 Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to setting-up and adjusting two different types of commercial radio frequency (RF) transmission and reception systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions

about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Commission commercial radio frequency (RF) transmission and reception systems as described in 7) and including:
    - A Identifying measurement parameters.
    - B Setting-up and adjusting in accordance with transmission/reception requirements and equipment manufacturer's instructions.
    - C Documenting adjustment settings with established procedures.

- D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in commissioning commercial radio frequency (RF) transmission and reception systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3; 2.4; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## UEENEEH028A Install microwave and antennae and waveguides

### Unit Descriptor

1)

This unit covers the installation and testing of waveguides and antennae for microwave communications systems. It encompasses working safely and to installation standards, matching hardware and accessories with that specified for a given location, installation techniques, pre commission adjustment of antennas and waveguides and following instruction and procedures.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, schedules and service manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships and the like

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

- |   |   |     |   |
|---|---|-----|---|
| 1 | Prepare to install and microwave antennae and waveguides. | 1.1 | OHS procedures for a given work area are identified, obtained and understood through established routines.  |
|   |   | 1.2 | Established OHS risk control measures are followed in preparation for the work.   |
|   |   | 1.3 | Safety hazards that have not previously been identified are reported and advise on risk control measures are sought from the work supervisor.     |
|   |   | 1.4 | The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken. |
|   |   | 1.5 | Advice is sought from the work supervisor and/or other appropriate person to ensure the work is co-ordinated effectively with others.             |
|   |   | 1.6 | Sources of materials that may be required for the work are established in accordance with established routines.                                   |
|   |   | 1.7 | Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.                      |
| 2 | Install and microwave antennae and waveguides.            | 2.1 | Established OHS risk control measures for carrying out the work are followed.   |
|   |   | 2.2 | Circuits/components are checked as being isolated where necessary in strict accordance OHS requirements and procedures.                           |

- 2.3 Antennas are installed in their specified locations and within limitation imposed by regulation.
- 2.4 Hardware and accessories are installed straight and square in the required locations and within acceptable tolerances.
- 2.5 Cables and conductors are terminated at accessories in accordance with manufacture's and job specifications and regulatory requirements
- 2.6 Procedures for referring non-routine events to immediate supervisor for directions are followed.
- 2.7 The installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
- 3 Test and microwave antennae and waveguides and report.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Pre-commissioning adjustments are made to the installation and the system to optimise performance in accordance with system specification.
  - 3.3 Work site is cleaned and made safe in accordance with established procedures.
  - 3.4 Work supervisor is notified of the completion of the installation work in accordance with established routines.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing microwave and antennae and waveguides. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.10.18 Electronic communications, microwave antennas and wave guide fundamentals
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by installing, connecting and adjusting any microwave antennae and waveguides consisting of antennas, rectangular and curved sections, T sections, joints and couplers and on at least two occasions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for

Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install microwave and antennae and waveguides as described in 7) and including:
    - A Reading and interpreting drawings of circuit arrangements and component locations.
    - B Installing and securing antenna, waveguide hardware and accessories accurately.
    - C Terminating cable and conductors correctly.
    - D Pre commission adjusting for optimum performance.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing microwave and antennae and waveguides.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE002A Dismantle, assemble and fabricate electrotechnology components
- UEENEEE005A Fix and secure equipment
- UEENEEE007A Use drawings, schedules and service manuals
- UEENEEE008A Install wiring and accessories for extra-low voltage circuits

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills

enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH029A **Diagnose and rectify faults in navigation systems**

### Unit Descriptor

1)

This unit covers fault finding and repair of faults in navigation systems. The unit encompasses safe working practices, interpreting circuit diagrams, applying logical diagnostic methods and knowledge of navigation system components, rectifying faults, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH016A Find and repair faults in the microwave amplifier sections of electronic apparatus

UEENEEH072A Find and repair faults in the RF sections of electronic apparatus

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1	Prepare to diagnose and rectify faults.	1.1	OHS procedures for a given work area are obtained and understood.
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
		1.4	The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel.
		1.5	Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
		1.6	Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.
2	Diagnose and rectify faults.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Logical diagnostic methods are applied to diagnose navigation system faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
  - 2.5 Suspected fault scenarios are tested as being the source of system problems.
  - 2.6 Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of electronics.
  - 2.7 Faults in the electronic components of the system are rectified to raise navigation system to its operation standard.
  - 2.8 System is tested to verify that the system operates as intended and to specified requirements.
  - 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
  - 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
  - 2.11 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in navigation systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.10.26 Electronic communications, navigation systems
- 2.18.1 Occupational Health and Safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise principles
- 2.18.9 Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four faults system faults an electronic navigation system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access

to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in navigation systems as detailed as described in 7) and including:

- A Applying logical diagnostic methods.
- B Using fault scenarios to test the source of system faults.
- C Identifying faults and competency needed to rectify them.
- D Rectifying faults in system electronics.
- E Verifying that the system operates correctly.
- F Documenting fault rectification.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in navigation systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit E001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:	

	2.4 to 2.8	2
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## **UEENEEH030A    Diagnose and rectify faults in satellite-based surveillance and observation systems**

### **Unit Descriptor**

1)

This unit covers fault finding and repair faults in surveillance and observation systems. The unit encompasses safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of surveillance system components, rectify faults, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH016A    Find and repair faults in the microwave amplifier sections of electronic apparatus

UEENEEH072A    Find and repair faults in the RF sections of electronic apparatus

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

1.1 OHS procedures for a given work area are obtained and understood.

1.2 Established OHS risk control measures and procedures are followed in preparation for the work.

1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.

1.4 The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel.

1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.

1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Logical diagnostic methods are applied to diagnose satellite-based surveillance and observation system faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
- 2.5 Suspected fault scenarios are tested as being the source of system problems.
- 2.6 Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of electronics.
- 2.7 Faults in the electronic components of the system are rectified to raise satellite-based surveillance and observation system to its operation standard.
- 2.8 System is tested to verify that the system operates as intended and to specified requirements.
- 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
- 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 2.11 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.

- 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in satellite-based surveillance and observation systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.10.11 Electronic communications, satellite
- 2.10.27 Electronic communications surveillance and observation
- 2.18.1 Occupational Health and Safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise principles
- 2.18.9 Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four faults system faults an electronic satellite-based surveillance and observation system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must

include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling

employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in satellite based surveillance and observation systems as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the source of system faults.
    - C Identifying faults and competency needed to rectify them.
    - D Rectifying faults in system electronics.
    - E Verifying that the system operates correctly.
    - F Documenting fault rectification.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in satellite based surveillance and observation systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills	Refer to the following Performance Criteria for examples of application:	

applied?	2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEH031A Diagnose and rectify faults in radar apparatus and systems

### Unit Descriptor

1)

This unit covers fault finding and repair faults in radar apparatus and system. The unit encompasses safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of radar system components, rectify faults, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH016A Find and repair faults in the microwave amplifier sections of electronic apparatus

UEENEEH072A Find and repair faults in the RF sections of electronic apparatus

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures

- 2.4 Logical diagnostic methods are applied to diagnose radar apparatus and systems faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
- 2.5 Suspected fault scenarios are tested as being the source of system problems.
- 2.6 Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of electronics.
- 2.7 Faults in the electronic components of the system are rectified to raise radar apparatus and system to its operation standard.
- 2.8 System is tested to verify that the system operates as intended and to specified requirements.
- 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
- 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 2.11 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in radar apparatus and systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.10.23	Electronics communications, secondary radar and related systems
2.10.24	Electronic communications, radar and sonar displays devices
2.10.25	Electronic communications, radar fundamentals
2.11.7.2	Advanced electronic testing and measuring devices techniques
2.18.1	Occupational Health and Safety principles
2.18.8.2	Occupational Health and Safety, enterprise principles
2.18.9	Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four faults system faults an electronic radar apparatus and system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range

statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Diagnose and rectify faults in radar apparatus and systems as described in 7) and including:
      - A Applying logical diagnostic methods.
      - B Using fault scenarios to test the source of system faults.
      - C Identifying faults and competency needed to rectify them.
      - D Rectifying faults in system electronics.
      - E Verifying that the system operates correctly.
      - F Documenting fault rectification.
      - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in Context of assessment’, which should also be used in the formal

learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in radar apparatus and systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit E001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.8	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEH032A **Diagnose and rectify faults in global positioning systems**

### **Unit Descriptor**

1)

This unit covers fault diagnosis and rectification in global positioning system. The unit encompasses safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of GPS system components, rectifying faults, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH016A Find and repair faults in the microwave amplifier sections of electronic apparatus

UEENEEH072A Find and repair faults in the RF sections of electronic apparatus

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures

- |   |   |   |  |
|---|---|---|--|
|   | 2.4   | Logical diagnostic methods are applied to diagnose global positioning systems faults employing measurements and estimations of system operating parameters referenced to system operational requirements. |  |
|   | 2.5   | Suspected fault scenarios are tested as being the source of system problems.  |  |
|   | 2.6   | Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of electronics.   |  |
|   | 2.7   | Faults in the electronic components of the system are rectified to raise global positioning system to its operation standard.   |  |
|   | 2.8   | System is tested to verify that the system operates as intended and to specified requirements.  |  |
|   | 2.9   | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.  |  |
|   | 2.10  | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |  |
|   | 2.11  | Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.  |  |
| 3 | Complete and report fault diagnosis and rectification activities. | 3.1   | OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2   | Work site is made safe in accordance with established safety procedures.   |
|   |   | 3.3   | Rectification of faults is documented in accordance with established procedures.   |
|   |   | 3.4   | Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in global positioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.10.28	Electronic communications global positioning systems
2.18.1	Occupational Health and Safety principles
2.18.8.2	Occupational Health and Safety, enterprise responsibilities
2.18.9	Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four faults system faults an electronic global positioning systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the

workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in global positioning systems as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the source of system faults.
    - C Identifying faults and competency needed to rectify them.
    - D Rectifying faults in system electronics.
    - E Verifying that the system operates correctly.
    - F Documenting fault rectification.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in global positioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which

is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit E001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.9; 2.10

## **UEENEEH033A    Diagnose and rectify faults in telecommunication apparatus and systems**

### **Unit Descriptor**

**1)**

This unit covers fault diagnosis and rectification in telecommunication apparatus and systems. The unit encompasses safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of telecommunication system components, rectifying faults, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A    Find and repair faults in the digital components in electronic apparatus

UEENEEH013A    Find and repair faults in the amplifier sections of electronic apparatus

UEENEEH015A    Find and repair faults in the microprocessor components of electronic apparatus

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.

- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.
- 2 Diagnose and rectify faults.
- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Logical diagnostic methods are applied to diagnose telecommunication apparatus and systems em faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
- 2.5 Suspected fault scenarios are tested as being the source of system problems.
- 2.6 Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of electronics.
- 2.7 Faults in the electronic components of the system are rectified to raise telecommunication apparatus and system to its operation standard.
- 2.8 System is tested to verify that the system operates as intended and to specified requirements.
- 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
- 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 2.11 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.

- |   |   |     |  |
|---|---|-----|--|
| 3 | Complete and report fault diagnosis and rectification activities. | 3.1 | OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2 | Work site is made safe in accordance with established safety procedures.   |
|   |   | 3.3 | Rectification of faults is documented in accordance with established procedures.   |
|   |   | 3.4 | Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in telecommunication apparatus and systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.1.2 Telephone system fundamentals
- 2.4.1.3 Telephone network facilities
- 2.4.2.1 Telecommunication earthing and protection
- 2.4.6 PABX fundamentals
- 2.4.7 PABX programming
- 2.4.8 Switches, hubs and routers
- 2.4.9 Decoders
- 2.18.1 Occupational Health and Safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities
- 2.18.9 Electronic Safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four faults system faults an electronic telecommunication apparatus and systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in telecommunication apparatus and systems as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the source of system faults.
    - C Identifying faults and competency needed to rectify them.
    - D Rectifying faults in system electronics.
    - E Verifying that the system operates correctly.
    - F Documenting fault rectification.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in telecommunication apparatus and systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEH034A **Diagnose and rectify faults in electronic medical equipment**

### **Unit Descriptor**

1)

This unit covers diagnosing and rectifying faults in the electronic aspects of electronic medical equipment. The unit encompasses safe working practices, interpreting process and circuit diagrams, applying knowledge of medical process controls to logical diagnosis procedures, rectifying faults, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A Find and repair faults in the digital components in electronic apparatus

UEENEEH013A Find and repair faults in the amplifier sections of electronic apparatus

UEENEEH015A Find and repair faults in the microprocessor components of electronic apparatus

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c.

However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
  - 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
  - 2.4 Logical diagnostic methods are applied to diagnose in electronic medical equipment faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
  - 2.5 Suspected fault scenarios are tested as being the source of system problems.
  - 2.6 Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of electronics.
  - 2.7 Faults in the electronic components of the system are rectified to raise global positioning system to its operation standard.
  - 2.8 System is tested to verify that the system operates as intended and to specified requirements.
  - 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
  - 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
  - 2.11 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
    - 3.1 OHS work completion risk control measures and procedures are followed.
    - 3.2 Work site is made safe in accordance with established safety procedures.
    - 3.3 Rectification of faults is documented in accordance with established procedures.

- 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in electronic medical equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.12.22.1 Medical equipment principles
- 2.12.22.2 Medical equipment, anatomy and physiology and infection control
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic Safe working practices
- 2.18.10 Medical equipment safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four faults system faults in four different types of electronic medical equipment.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in electronic medical equipment as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the source of system faults.
    - C Identifying faults and competency needed to rectify them.
    - D Rectifying faults in system electronics.
    - E Verifying that the system operates correctly.
    - F Documenting fault rectification..
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in electronic medical equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.9; 2.10



## UEENEEH035A Design custom electronic installations

### Unit Descriptor

1)

This unit covers the design of home entertainment aspects of custom electronic installations and energy control systems. It encompasses developing control scenarios based on a design brief, negotiating with architect/designer, builder and client and the like, applying knowledge of electronic audio/video components and home theatre acoustics and relevant electrical installation regulation, developing design drawings and obtaining approval for final design.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH005A Verify compliance and functionality of custom electronic installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to design custom electronic installations.	<p>1.1 OHS processes and procedures for a given work area are obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the proposed custom electronic installation is determined from the design brief or in consultations with appropriate person(s).</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.</p>
2 Develop installation design.	<p>2.1 Knowledge of audio/video components, home theatre acoustics and regulations is applied to the design.</p> <p>2.2 Alternative arrangements for the installation design are considered based on the requirements outlined in the design brief.</p> <p>2.3 Safety, functional and budgetary considerations are incorporated in the installation design.</p> <p>2.4 Installation design draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.5 Installation design is documented for submission to appropriate person(s) for approval.</p> <p>2.6 Solutions to unplanned situation are provided consistent with organisation policy.</p>
3 Obtain approval for installation design.	<p>3.1 Installation design is presented and explained to client and/or other relevant person(s).</p> <p>3.2 Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation policy.</p>

- 3.3 Final design is documented and approval obtained from appropriate person(s).
- 3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing custom electronic installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.5.5 Technical standards, regulations and codes for extra-low voltage work
- 2.5.11 Environmental and heritage awareness
- 2.9.16.2 Acoustics, spatial treatment and sound reproduction
- 2.9.40 Integrated audio systems
- 2.9.80 Video and display set up
- 2.9.81 Audio/video control equipment
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by designing the entertainment aspects of two custom electronic installations one of which shall incorporate dedicated home theatre.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design custom electronic installations as described in 7) and including:
    - A Developing outlines of alternative designs.
    - B Developing the design within the safety and functional requirements and budget limitations.
    - C Documenting and presenting design effectively.
    - D Successfully negotiating design alteration requests.
    - E Obtaining approval for final design.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in 'Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace

and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing custom electronic installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit E001A and other discipline specific occupational health and safety units(s) shall be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this	Refer to the following Performance Criteria for examples of application:	

competency?	1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEH036A Design commercial audio/video installations**

### **Unit Descriptor**

1)

This unit covers the design of audio/video facilities in meeting rooms, classrooms, studios, theatres, halls and the like. It encompasses applying knowledge of electronic audio/video components, acoustics and visual displays, analogue and digital communication, multimedia storage and reproduction, negotiating with clients and others and documenting design.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH037A Commission commercial audio/video systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to design commercial audio/video installations.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the proposed integrated installation is determined from the design brief or in consultations with appropriate person(s).
- 1.4 Design development work is planned to meet scheduled timelines in consultation with others involved in the work.

2 Develop installation design.

- 2.1 Knowledge of audio/video components, acoustics and visual displays, analogue and digital communication, multimedia storage and reproduction is applied to designing the installation.
- 2.2 Alternative arrangements for the installation design are considered based on the requirements outlined in the design brief.
- 2.3 Safety, functional and budgetary considerations are incorporated in the installation design.
- 2.4 Installation design draft is checked for compliance with the design brief and regulatory requirements.
- 2.5 Installation design is documented for submission to appropriate person(s) for approval.
- 2.6 Solutions to unplanned situation are provided consistent with organisation policy.

3 Obtain approval for installation design.

- 3.1 Installation design is presented and explained to client representative and/or other relevant person(s).
- 3.2 Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation policy.

- 3.3 Final design is documented and approval obtained from appropriate person(s).
- 3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing commercial audio/video installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.5.5 Technical standards, regulations and codes for extra-low voltage work
- 2.5.11 Environmental and heritage awareness
- 2.6.9.3 Venue lighting for audio/video/live presentations
- 2.9.16.2 Acoustics, spatial treatment and sound reproduction
- 2.18.1 Occupational Health and Safety principles

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by designing two commercial audio/video installations one of which shall incorporate analogue and digital communication, multimedia storage and reproduction.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range

statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Design commercial audio/video installations as described in 7) and including:
      - A Developing outlines of alternative designs.
      - B Developing the design within the safety and functional requirements and budget limitations.
      - C Documenting and presenting design effectively.
      - D Successfully negotiating design alteration requests.
      - E Obtaining approval for final design.
      - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace

and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing commercial audio/video installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) shall be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this	Refer to the following Performance Criteria for examples of application:	

competency?	1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH037A Program and commission commercial audio/video systems

### Unit Descriptor

1)

This unit covers testing, adjusting and balancing of audio/video facilities in meeting rooms, classrooms, studios, theatres, halls and the like. The unit encompasses working safely and to specifications, measuring and adjusting necessary parameters to meet specified performance, working with clients and documenting and certifying set performance parameters.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH010A Install commercial audio/video system components

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and

typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1	Prepare to commission.	1.1	OHS procedures for a given work area are obtained and understood.
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
		1.4	The extent of programming and commissioning is determined from reports and other documentation and fro discussion with appropriate personnel.
		1.5	Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
		1.6	Tools, equipment and testing devices needed to program and commission are obtained in accordance with established procedures and checked for correct operation and safety.
2	Commission audio/video systems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
		2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Audio/video devices are checked for correct location and alignment.
  - 2.5 Functional settings are made for each audio/video apparatus in accordance with design specifications.
  - 2.6 Audio/video system functions are tested in accordance with commissioning requirements.
  - 2.7 Sources of audio/video system anomalies are identified and corrected.
  - 2.8 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
  - 2.9 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
  - 2.10 Commissioning activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report commissioning activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 ‘As-installed’ audio/video system is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and programming and commissioning commercial audio/video systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.50 Commercial audio/video systems commissioning process
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by commissioning at least two different commercial audio/video systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Program and commission commercial audio/video systems as described in 7) and including:
    - A Setting apparatus functions.
    - B Testing system functions.
    - C Identifying and correcting function anomalies.
    - D Documenting 'as-installed' system correctly.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in programming and commissioning commercial audio/video systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) shall be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.7 to 2.9	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.8; 2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8; 2.9

## UEENEEH038A Find and repair faults in complex power supplies

### Unit Descriptor

1)

This unit covers fault finding and repair of regulated and switch mode power supplies. The unit encompasses safe working practices, interpreting circuit diagrams, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH011A Solve problems in d.c. power supplies with single phase input

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also be used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults in complex power supplies.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Fault finding is approached methodically drawing on knowledge of complex power supplies and circuits using measured and calculated values of power supply parameters.
  - 2.5 Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.6 Faulty components are rechecked and their fault status confirmed.
  - 2.7 Materials required for the repair work are sourced and obtained in accordance with established procedures.
  - 2.8 Effectiveness of the repair is tested in accordance with established procedures.
  - 2.9 Apparatus is reassembled, finally tested and prepared for return to customer.
  - 2.10 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.11 Fault finding and repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report repair activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work area is cleaned and made safe in accordance with established procedures.
  - 3.3 Written justification is made for repairs to apparatus.
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and programming and commissioning commercial audio/video systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.11	Linear and switch mode power supplies
2.9.65	Regulated power supplies
2.9.66	Switching power supplies
2.11.7.1	Electronic testing and measuring devices and techniques
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing faults in a regulated power supply and a switch mode power supply.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access

to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Program and commission commercial audio/video systems as described in 7) and including:

- A Using methodical fault finding techniques.
- B Finding faults efficiently.
- C Replacing components without damage.
- D Providing written justification for the repairs.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in programming and commissioning commercial audio/video systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit E001A and other discipline specific occupational health and safety units(s) shall be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2

**Skills Enabling 8.7)**

**Employment**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEH039A Solve problems in basic amplifier circuits

### Unit Descriptor

1)

This unit covers determining correct operation of basic amplifier circuits. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in basic amplifier circuits.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH002A Carry out basic repairs to electronic apparatus by replacement of components

OR

UEENEEH070A Terminate and connect components, conductors, wiring and cables for electronic circuits

AND

UEENEEH014A Solve problems in frequency dependent circuits

OR

UEENEEG002A Solve problems in single and three phase low voltage circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved

contracts of training. It may also used to augment formally acquired competencies.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on basic amplifier circuits.

1.1 OHS procedures for a given work area are obtained and understood.

1.2 OHS risk control work preparation measures and procedures are followed.

1.3 The natures of the amplifier circuit problems are obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.

1.5 Sources of materials that may be required for the work are established in accordance with established procedures.

	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.	
2	Solve basic amplifier circuit problems.	2.1	OHS risk control work measures and procedures are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
		2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		2.4	Established methods are used to solve problems from measure and calculated values as they apply to basic amplifier circuits.
		2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
		2.6	Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3	Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Justification for solutions used to solve circuit problems is documented.
		3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in basic amplifier circuits. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.8 Amplifier Fundamentals
- 2.9.12 Electronic fault finding
- 2.11.7.1 Electronic testing and measuring devices and

techniques

2.18.1 Occupational Health and Safety principles

2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving at least two of the following types basic amplifier circuit problems:

- Determining the operating parameters of an amplifier existing circuit
- Alternating an existing amplifier circuit to comply with specified operating parameters
- Developing an amplifier circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access

to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in basic amplifier circuits as described in 7) and including:

- A Using methodical problem solving methods.
- B Taking measurements correctly and accurately.
- C Calculating parameters correctly and accurately.
- D Providing solution to amplifier circuit problems.
- E Providing written justification for the solutions to problems.
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in basic amplifier circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEE001A and other discipline specific occupational health and safety units(s) shall be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH040A **Diagnose and rectify faults in sonar apparatus and systems**

### Unit Descriptor

1)

This unit covers fault finding and the repair of faults in sonar apparatus and system. The unit encompasses safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of sonar system components, rectifying faults, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A	Find and repair faults in the digital components in electronic apparatus
UEENEEH013A	Find and repair faults in the amplifier sections of electronic apparatus
UEENEEH015A	Find and repair faults in the microprocessor components of electronic apparatus
UEENEEH016A	Find and repair faults in the microwave amplifier sections of electronic apparatus
UEENEEH072A	Find and repair faults in the RF sections of electronic apparatus

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |   |      |   |
|---|---|------|---|
| 2 | Diagnose and rectify faults.                                      | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |   | 2.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.  |
|   |   | 2.3  | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.   |
|   |   | 2.4  | Logical diagnostic methods are applied to diagnose sonar apparatus and system faults employing measurements and estimations of system operating parameters referenced to system operational requirements. |
|   |   | 2.5  | Suspected fault scenarios are tested as being the source of system problems.  |
|   |   | 2.6  | Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of electronics.   |
|   |   | 2.7  | Faults in the electronic components of the system are rectified to raise sonar apparatus and system to its operation standard.  |
|   |   | 2.8  | System is tested to verify that the system operates as intended and to specified requirements.  |
|   |   | 2.9  | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.  |
|   |   | 2.10 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|   |   | 2.11 | Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.  |
| 3 | Complete and report fault diagnosis and rectification activities. | 3.1  | OHS work completion risk control measures and procedures are followed.  |
|   |   | 3.2  | Work site is made safe in accordance with established safety procedures.  |

- 3.3 Rectification of faults is documented in accordance with established procedures.
- 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in sonar apparatus and systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.10.20 Electronic communications, sonar Transducers and arrays
- 2.10.21 Electronic communications, sonar system operating principles
- 2.10.22 Electronic communications, sonar measurement and set up
- 2.10.24 Electronic communications, radar and sonar displays devices
- 2.11.7.2 Advanced electronic testing and measuring devices and techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities
- 2.18.9 Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four faults system faults an electronic sonar apparatus and system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in sonar apparatus and systems as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the source of system faults.
    - C Identifying faults and competency needed to rectify them.
    - D Rectifying faults in system electronics.
    - E Verifying that the system operates correctly.
    - F Documenting fault rectification.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and  
specific  
resources for**
**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

**assessment**

This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in sonar apparatus and systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit E001A and other discipline specific occupational health and safety units shall be reassessed in relation to this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## **UEENEEH041A    Manage and implement electronic projects**

### **Unit Descriptor**

**1)**

This unit covers the management and implementation of electronic projects involving design, modifications, installation, and/or maintenance of systems and equipment. The unit encompasses management of safety, budget variation, personnel, resources, and critical path timelines and completion documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 6 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

**4)**

Electronics

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Establish the scope of the project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.3 Project’ deliverables and budget are established from project planning and other relevant documentation and from discussions with appropriate person(s).</p> <p>1.3 Measurable outcomes are identifies to evaluate the project on completion from project planning and other relevant documentation.</p> <p>1.4 Plant, materials and skills needed to meet project outcome are established from project planning and other relevant documentation.</p> <p>1.5 Processes and procedures are developed for managing contract variations from discussions with appropriate person(s) and in accordance with contractual agreement.</p>
2 Manage and implement electronic project.	<p>2.1 OHS policies, procedures and programs are implemented and monitored.</p> <p>2.2 Achievement of project outcomes is delegated to appropriately competent persons involved in the project.</p> <p>2.3 Risk events are identified and project plan strategies implemented to ensure that outcomes are achieved to the required standard of quality specified in the contract and safety required by organization’s policy.</p> <p>2.4 Procurement processes and procedures are monitored to ensure on time supply of plant and materials and in accordance with organisation policy.</p> <p>2.5 Project is progress is monitored against schedule, quality requirements and budget.</p> <p>2.6 Conflict issues at the work site and between stakeholders, clients and regulators are identified and managed in accordance with organisation policy.</p>

- |                     |     |   |
|---------------------|-----|---|
|                     | 2.7 | Variations are managed in accordance with agreed processes and in accordance with the contract.                                     |
|                     | 2.8 | Project records are maintained and progress reports written and forwarded to all appropriate person(s).                             |
| 3 Complete project. | 3.1 | Project outcomes are reviewed against original plan, implemented risk strategies, contract variations, safety record and budget.    |
|                     | 3.2 | Project completion acceptance is sought from appropriate person(s) and hand-over documented in accordance with organisation policy. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and managing electronic projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.2.17   | Project management  |
| 2.2.19   | Customer/Client relations                                   |
| 2.2.29   | Electronic industry sector customs and practices            |
| 2.18.8.2 | Occupational Health and Safety, enterprise responsibilities |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to managing an industry accepted medium sized electronic project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of 8.1)

## Assessment

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this unit

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in 6) Essential Knowledge and Associated Skills (EKAS) of this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred industry and/or regulatory benchmark requirements, namely a percentile grade
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Manage electronic projects as described in 7) and including:
    - A Establishing the scope of the project accurately.
    - B Ascertaining the input a project.
    - C Developing effective management processes.
    - D Managing resources and variations effectively.
    - E Resolving conflicts.
    - F Adopting risk management strategies.
    - G Maintaining records and submitting progress reports.
    - H Meeting project outcomes.
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in managing electronic projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.4: 2.6 to 2.8	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	3

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3; 2.5; 2.7; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.3; 2.7; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.8; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6
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## UEENEEH042A **Solve problems in oscillator sections of electronic apparatus**

### Unit Descriptor

1)

This unit covers determining correct operation of discrete component and modularised oscillator sections of electronic apparatus. It encompasses working safely, problem solving procedures, including the use of; voltage, current, resistance and phase measuring devices, providing solutions derived from measurements and calculations to predictable problems in oscillator sections/circuits.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEEH014A Solve problems in frequency dependant circuits

UEENEEE007A Use drawings, diagrams schedules and manuals

UEENEEH039A Solve problems in basic amplifier circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical

work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on oscillator sections.

1.1 OHS procedures for a given work area are obtained and understood.

1.2 OHS risk control work preparation measures and procedures are followed.

1.3 The nature of oscillator problems is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.

1.5 Sources of materials that may be required for the work are established in accordance with established procedures.

1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve oscillator section problems.

2.1 OHS risk control work measures and procedures are followed.

2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- |     |  |
|-----|--|
| 2.3 | Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.   |
| 2.4 | Established methods are used to solve problems from measure and calculated values as they apply to oscillator sections in an electronic apparatus.     |
| 2.5 | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
| 2.6 | Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices. |
| 3   | Complete work and document problem solving activities.   |
| 3.1 | OHS work completion risk control measures and procedures are followed.   |
| 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
| 3.3 | Justification for solutions used to solve circuit problems is documented.  |
| 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures.                                 |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in oscillator sections of electronic apparatus.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.9.67 | Feedback filters and oscillators          |
| 2.18.1 | Occupational Health and Safety principles |
| 2.18.9 | Electronic Safe working practices         |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by solving at least three problems in typical oscillator sections of electronic apparatus

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in oscillator sections of electronic apparatus as described in 7) Range: and including:
    - A Using methodical problem solving methods.
    - B Taking measurements correctly and accurately.
    - C Calculating parameters correctly and accurately.
    - D Providing solution to oscillator component/circuit problems.
    - E Providing written justification for the solutions to problems.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

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**Context of and 8.3)**

**specific resources for assessment**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in oscillator sections of electronic apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with unit:.

UEENEEH002A      Carry out basic repairs to electronic equipment

UEENEEH039A      Solve problems in basic amplifier circuits

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling  
Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH043A **Diagnose and rectify faults in digital subsystems of electronic controls**

### **Unit Descriptor**

1)

This unit covers diagnosing and rectifying faults in digital components of electronic control systems. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of digital subsystems to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG008A Find and repair faults in electrical apparatus and circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and

typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |   |  |  |
|---|---|--|--|
|   | 2.4   | Logical diagnostic methods are applied to diagnose electronic control system apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements. |  |
|   | 2.5   | Suspected fault scenarios are tested as being the cause(s) of system fault.  |  |
|   | 2.6   | Cause of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the digital subsystems.  |  |
|   | 2.7   | Faults in the electronic components of the system are rectified to raise apparatus and system to its operational standard.   |  |
|   | 2.8   | System is tested to verify that the system operates as intended and to specified requirements  |  |
|   | 2.9   | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.   |  |
|   | 2.10  | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |  |
|   | 2.11  | Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.           |  |
| 3 | Complete and report fault diagnosis and rectification activities. | 3.1  | OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2  | Work site is made safe in accordance with established safety procedures.   |
|   |   | 3.3  | Rectification of faults is documented in accordance with established procedures.   |
|   |   | 3.4  | Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified. |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in digital subsystems of electronic controls. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.4.1 Digital electronics fundamentals
- 2.9.12 Electronic fault finding
- 2.11.7.1 Electronic testing and measuring devices and techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic Safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four of the following faults in digital subsystems.

- Open-circuit
- Short-circuit
- Incorrect or failed connections
- Insulation failure
- Unsafe condition
- Apparatus/component failure
- Related mechanical failure

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in digital subsystems of electronic controls as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the cause(s) of system faults.
    - C Identifying faults and their cause and competency needed to rectify them.
    - D Rectifying faults in system digital subsystems.
    - E Verifying that the system operates correctly.
    - F Documenting fault rectification.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in digital subsystems of electronic controls.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG008A Find and repair faults in electrical apparatus and circuits

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>

1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## **UEENEEH044A    Diagnose and rectify faults in analogue circuits and components in electronic control systems**

### **Unit Descriptor                    1)**

This unit covers diagnosing and rectifying faults in analogue applications in electronic control systems. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of analogue circuits and components to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

Note.  
Examples of analogue applications are power and differential amplifiers, integrators, comparators function generators precision rectifiers, active filters and the like.

### **Prerequisite Unit(s)            2)**

### **Competencies                    2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEG008A    Find and repair faults in electrical apparatus and circuits

### **Literacy and numeracy skills            2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit                    3)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise                3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the

workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to diagnose and rectify faults	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.</p> <p>1.4 The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel</p> <p>1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site</p> <p>1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Diagnose and rectify faults	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures</p>

- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Logical diagnostic methods are applied to diagnose electronic control system apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
- 2.5 Suspected fault scenarios are tested as being the cause(s) of system fault.
- 2.6 Cause of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the analogue circuits and components.
- 2.7 Faults in the electronic components of the system are rectified to raise apparatus and system to its operational standard.
- 2.8 System is tested to verify that the system operates as intended and to specified requirements
- 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
- 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 2.11 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in analogue circuits and components in electronic control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.8	Amplifier fundamentals
2.9.9.1	Advanced amplifiers
2.9.9.2	Amplifier applications
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.9	Electronic Safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four of the following faults in analogue circuits and components:

- Open-circuit
- Short-circuit
- Incorrect or failed connections
- Insulation failure
- Unsafe condition
- Apparatus/component failure
- Related mechanical failure

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in analogue circuits and components in electronic control systems as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the cause(s) of system faults.
    - C Identifying faults and their cause and competency needed to rectify them.
    - D Rectifying faults in system analogue circuits and components.
    - E Verifying that the system operates correctly.
    - F Documenting fault rectification.

- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in analogue circuits and components in electronic control systems

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG008A Find and repair faults in electrical apparatus and circuits

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key**

**8.6)**

**competencies**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment**
**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEH045A    **Develop solutions to analogue electronic problems**

### **Unit Descriptor**

1)

This unit covers developing engineering solutions to resolve problems with analogue electronics. It encompasses working safely, apply extensive knowledge of analogue electronics circuit and device operation and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical analogue electronic problems are those encountered in meeting performance requirements and compliance standards, revising analogue electronics operating parameters and dealing with analogue electronic malfunctions.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH039A    Solve problems in basic amplifier circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace for work plant and equipment which is directly connected to installation wiring that operates at voltages above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to develop engineering solution for analogue electronic problems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the analogue electronic problem is determined from performance specifications and situation reports and in consultations with relevant persons.
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.

2 Develop engineering solution for analogue electronic problems.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of analogue electronics circuit, device operation, characteristics and applications are applied to developing solutions to analogue electronic problems.
- 2.3 Parameters, specifications and performance requirements in relation to each analogue electronic problem are obtained in accordance with established procedures.

- |   |   |  |
|---|---|--|
|   | 2.4   | Approaches to resolving analogue electronic problems are analysed to provide most effective solutions.   |
|   | 2.5   | Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.  |
|   | 2.6   | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards  |
| 3 | Test, document and implement engineering solution for analogue electronic problems. |  |
|   | 3.1   | Solutions to analogue electronic problems are tested to determine their effectiveness and modified where necessary.  |
|   | 3.2   | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.   |
|   | 3.3   | Appropriately competent and qualified person(s) required to implement solutions to analogue electronic problems are coordinated in accordance with regulatory requirements and enterprise policy. (See Note) |
|   | 3.4   | Justification for solutions used to solve analogue electronic problems is documented for inclusion in work/project development records in accordance with professional standards.                            |

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing solutions to analogue electronic problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.9.84 | Advanced analogue electronics             |
| 2.9.85 | Advanced power amplifiers                 |
| 2.18.1 | Occupational Health and Safety principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four analogue electronic problems.

Note.

Typical analogue electronic problems are those encountered in meeting performance requirements and compliance standards, revising an analogue electronic operating parameters and dealing with analogue electronic malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop solutions to analogue electronic problems as described in 7) and including:
    - A Understanding the extent of the analogue electronic problem.
    - B Forming effective strategies for solution development and implementation.
    - C Obtaining analogue electronic parameters, specifications and performance requirements appropriate to each problem.
    - D Testing and solutions to analogue electronic problems.
    - E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
    - F Documenting justification of solutions implemented in accordance with professional standards.

- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing solutions to analogue electronic problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2,

Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

### **Skills Enabling Employment**

#### **8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH046A Solve fundamental problems in electronic communications systems

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers ascertaining correct operation of communications systems and solving fundamental system problems as met in engineering support work functions. It encompasses working safely, problem solving techniques, the use of a range of measuring devices, providing solutions derived from measurements to predictable problems in electronic communication systems.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEH013A Solve problems in amplifier sections of electronic apparatus</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 33%;">Reading</td> <td style="width: 10%;">5</td> <td style="width: 33%;">Writing</td> <td style="width: 10%;">5</td> <td style="width: 14%;">Numeracy</td> <td style="width: 10%;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 4 level or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to solve fundamental problems in electronic communications systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.6 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve fundamental problems in electronic communications systems.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |  |  |   |
|---|--|--|---|
|   | 2.4  | Knowledge of fundamental characteristics communication system components and transmission media is applied to solving system problems.                 |   |
|   | 2.5  | Logical approaches are used to solve system problems from measure and calculated values as they apply to communication systems.                        |   |
|   | 2.6  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |   |
|   | 2.7  | Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices. |   |
| 3 | Complete work and document problem solving activities. | 3.1  | OHS risk control work completion measures and procedures are followed.        |
|   |  | 3.2  | Work site is cleaned and made safe in accordance with established procedures. |
|   |  | 3.3  | Reports are written outlining system problem and justifying solutions used.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving fundamental problems in electronic communications systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.10.1.1 | Electronic communications, principles     |
| 2.18.1   | Occupational Health and Safety principles |
| 2.18.9   | Electronic safe working practices         |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by solving four problems in electronic communications systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

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#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve fundamental problems in electronic communications systems as described in 7) and including:
    - A Applying knowledge of communication system and transmission media characteristics.
    - B Using logical and methodical approaches to solving system problems.
    - C Solving system problems.
    - D Providing written justification for solutions used.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving fundamental problems in electronic communications systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## UEENEEH047A Assess compliance of electronic apparatus

### Unit Descriptor

1)

This unit covers assessing electronic apparatus for compliance with a standard and/or regulation for the purpose of certification or approval. The unit encompasses safe working practices, determining specified requirements, inspecting, setting up performance tests, evaluating inspection and test results and documenting evaluation outcomes.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after all other relevant competency standard units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work

environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to evaluate electronic apparatus.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Examination and testing area is checked for safety hazards and risk control measures implemented in strict accordance with safety policy and procedures.
- 1.4 Relevant documentation is obtained and read to determine the certification/approval specifications for which the equipment is to be assessed. (see note 1)
- 1.5 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.6 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety.

2 Evaluate electronic apparatus.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 In depth knowledge of the operating requirements of the electronic apparatus under scrutiny is applied to the assessment process.

- |   |  |   |
|---|--|---|
|   | 2.5  | Apparatus examination and tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny.                 |
|   | 2.6  | Apparatus examination and tests are carried out methodically and results and comments systematically noted.   |
|   | 2.7  | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   | 2.8  | Assessment is carried out without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.        |
| 3 | Complete work and document evaluate results. | 3.1 OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2 Work site is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3 Examination and test results are evaluated and non-compliance issues identified.  |
|   |  | 3.4 Examination, test results and comments on non-compliance issues are documented and reported to appropriate person(s) in accordance with established procedures. |

Note 1

Examples of documentation are those specifying safety requirements, technical standard, as marketed technical performance, product quality endorsement standards and the like.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and assessing compliance of electronic apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.2.24 | Technical examination and testing methods                           |
| 2.5.8  | Technical standards, regulations and codes for electronic apparatus |
| 2.18.1 | Occupational Health and Safety principles                           |
| 2.18.9 | Electronic Safe working practices                                   |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by assessing four different electronic apparatus.

Note:

Examples of apparatus are audio amplifiers, radio and televisions receivers, video displays, audio and video recording/replay devices, two-way radios, cell phones, instrumentation devices, control devices and the like.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for

Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assess compliance of electronic apparatus as described in 7) and including:
    - A Interpreting compliance documents.
    - B Setting up and conducting appropriate examinations and tests.
    - C Identifying non-compliance defects.
    - D Reporting examination and test results and non-compliance issues clearly and accurately.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and 8.3)**

**specific resources for assessment**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assessing compliance of electronic apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG031A      Assess compliance of electrical apparatus

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5; 2.6	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5; 2.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5; 2.6	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

# UEENEEH048A Design and develop advanced digital systems

## Unit Descriptor

1)

This unit covers development of digital electronic systems as occur in engineering product development work. It encompasses working safely, following design brief, applying knowledge of digital components/devices, interpreting device/component specifications, constructing prototype devices, applying programming techniques to programmable devices, testing developed system prototype operation and documenting design and development work.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A      Solve problems in digital components of electronic apparatus

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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## Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

## Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

## Competency Field

4)

Electronics

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to design and develop advance digital systems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the proposed digital system development is determined from the design brief or in consultations with appropriate person(s).</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.</p> <p>1.5 Materials and devices/components required for the work are selected on compatibility of their specifications with digital system requirements and project budget constraints.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Design and develop advance digital systems.	<p>2.1 OHS risk control work measures and procedures are followed.</p> <p>2.2 Knowledge of digital devices and systems and compliance standards are applied to the design</p> <p>2.3 Alternative arrangements for the design are considered based on the requirements outlined in the design brief.</p> <p>2.4 Safety, functional and budget considerations are incorporated in the design.</p> <p>2.5 Prototype devices and circuits are constructed and tested for compliance with the design brief and regulatory requirements.</p> <p>2.6 Prototype malfunctions are rectified and retested to ensure effective operation of design.</p>

	2.7	Digital system design is documented for submission to appropriate person(s) for approval.
	2.8	Solutions to unplanned situation are provided consistent with organisation policy.
3 Obtain approval for advance digital systems design.	3.1	Digital system design is presented and explained to client representative and/or other relevant person(s).
	3.2	Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation policy.
	3.3	Final design is documented and approval obtained from appropriate person(s).
	3.4	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and developing advanced digital systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.4.4	Digital applications
2.11.7.2	Advanced electronic testing and measuring devices and techniques
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic Safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing and developing a digital system with at least five interacting functions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and develop advanced digital systems as described in 7) and including:
    - A Developing the design within the safety and functional requirements and budget limitations.
    - B Documenting and presenting design effectively.
    - C Successfully negotiating design alteration requests.
    - D Obtaining approval for final design.
    - E Developing the design within the safety and functional requirements and budget limitations.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing and developing advanced digital systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.3; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 2.5; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	3

**Skills Enabling  
Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 2.3; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.7; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

# UEENEEH049A    **Develop solutions to audio electronic problems**

**Unit Descriptor**

1)

This unit covers developing engineering solutions to resolve problems with audio electronics. It encompasses working safely, applying extensive knowledge of audio electronics circuits and device operation and application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives

Note.

Typical audio electronic problems are those encountered in meeting performance requirements and compliance standards, revising audio electronic operating parameters and dealing with audio electronic malfunctions.

**Prerequisite Unit(s)**

2)

**Competencies**

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEH039A      Solve problems in basic amplifier circuits

**Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading      5      Writing      5      Numeracy      5

**Application of the Unit**

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

**Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to develop engineering solution for audio electronic problems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the audio electronic problem is determined from performance specifications and situation reports and in consultations with relevant persons.
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.

2 Develop engineering solution for audio electronic problems.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of audio electronics circuit, device/component operation, characteristics and applications are applied to developing solutions to audio electronic problems.
- 2.3 Parameters, specifications and performance requirements in relation to each audio electronic problem are obtained in accordance with established procedures.

- |     |   |  |     |  |     |  |     |   |     |  |
|-----|---|--|-----|--|-----|--|-----|---|-----|--|
|     | 2.4   | Approaches to resolving audio electronic problems are analysed to provide most effective solutions.  |     |  |     |  |     |   |     |  |
|     | 2.5   | Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.  |     |  |     |  |     |   |     |  |
|     | 2.6   | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.   |     |  |     |  |     |   |     |  |
| 3   | Test, document and implement engineering solution for audio electronic problems.  | <table border="0"> <tr> <td>3.1</td> <td>Solutions to audio electronic problems are tested to determine their effectiveness and modified where necessary.</td> </tr> <tr> <td>3.2</td> <td>Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.</td> </tr> <tr> <td>3.3</td> <td>Appropriately competent and qualified person(s) required to implement solutions to audio electronic problems are coordinated in accordance with regulatory requirements and enterprise policy. (See Note)</td> </tr> <tr> <td>3.4</td> <td>Justification for solutions used to solve audio electronic problems is documented for inclusion in work/project development records in accordance with professional standards.</td> </tr> </table> | 3.1 | Solutions to audio electronic problems are tested to determine their effectiveness and modified where necessary. | 3.2 | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed. | 3.3 | Appropriately competent and qualified person(s) required to implement solutions to audio electronic problems are coordinated in accordance with regulatory requirements and enterprise policy. (See Note) | 3.4 | Justification for solutions used to solve audio electronic problems is documented for inclusion in work/project development records in accordance with professional standards. |
| 3.1 | Solutions to audio electronic problems are tested to determine their effectiveness and modified where necessary.  |  |     |  |     |  |     |   |     |  |
| 3.2 | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.  |  |     |  |     |  |     |   |     |  |
| 3.3 | Appropriately competent and qualified person(s) required to implement solutions to audio electronic problems are coordinated in accordance with regulatory requirements and enterprise policy. (See Note) |  |     |  |     |  |     |   |     |  |
| 3.4 | Justification for solutions used to solve audio electronic problems is documented for inclusion in work/project development records in accordance with professional standards.                            |  |     |  |     |  |     |   |     |  |

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and developing advanced digital systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.9.16.2 | Acoustics, spatial treatment and sound reproduction              |
| 2.9.17.1 | Audio reproduction, electronic components                        |
| 2.9.86   | Audio system advance diagnostic techniques                       |
| 2.11.7.2 | Advanced electronic testing and measuring devices and techniques |
| 2.18.1   | Occupational Health and Safety principles                        |

## 2.18.9 Electronic Safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four audio electronic problems.

Note.

Typical audio electronic problems are those encountered in meeting performance requirements and compliance standards, revising an audio electronic operating parameters and dealing with audio electronic malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions

about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and develop advanced digital systems as described in 7) and including:
    - A Understanding the extent of the audio electronic problem.
    - B Forming effective strategies for solution development and implementation.
    - C Obtaining audio electronic parameters, specifications and performance requirements appropriate to each problem.

- D Testing and solutions to audio electronic problems.
- E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
- F Documenting justification of solutions implemented in accordance with professional standards.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing and developing advanced digital systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## **UEENEEH050A Assemble and set up basic wired and wireless security systems**

### **Unit Descriptor**

**1)**

This unit covers installing electronic security systems with up to 50 connected devices typically used in single domestic and small commercial premises. It encompasses, working safely and to standards, following oral and written instructions and procedures, securely placing and connecting security system components, and applying customer relation protocols.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEE002A Dismantle, assemble and fabricate electro technology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, schedules and service manuals

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

### **Application of the Unit**

**3)**

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice of this unit in the work place is subject to State and Territory Security Industry regulations. Where the security system has a call-back-to-base facility practice in the workplace is also subject to ACA regulations to undertake cabling work.

Note:

Units 'UEENEEF001A and UEENEEF002A provide the required skill and knowledge for registration in accordance with ACA regulations for undertaking cabling work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to assemble and set up basic wired and wireless security systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines.
- 1.2 Established OHS risk control measures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are reported and advise on risk control measures, are sought from the work supervisor.
- 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor or other appropriate person to ensure the work is co-ordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established routines.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

- |  |     |   |
|--|-----|---|
| 2 Assemble basic wired and wireless security systems.  | 2.1 | Established OHS risk control measures for carrying out the work are followed.   |
|  | 2.2 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.   |
|  | 2.3 | Security controllers, access, intrusion and surveillance devices are located for optimum performance within limitation imposed by customers and regulations.                        |
|  | 2.4 | Accessories are installed straight and square in the required locations and within acceptable tolerances.   |
|  | 2.5 | Cables and conductors are terminated at accessories in accordance with manufacture’s specifications and regulatory requirements.  |
|  | 2.6 | Procedures for referring non-routine events to immediate supervisor for directions are followed.  |
|  | 2.7 | Security installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices. |
| 3 Complete and document security systems installation. | 3.1 | OHS work completion risk control measures and procedures are followed.  |
|  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.   |
|  | 3.3 | Security system is documented in accordance with regulatory requirement and established routines.   |

**REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and assembling and setting up basic wired and wireless security systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.5.11 Environmental and heritage awareness
- 2.5.20 Technical standards, regulations and codes for security systems
- 2.9.41.1 Security systems installation basics
- 2.18.1 Occupational Health and Safety principles

## 2.18.9 Electronic Safe working practices

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by installing at least two basic security system. Systems shall consist of a controller and access device and at least two other different connected device both wire and wireless.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment****8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational

requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble and set up basic wired and wireless security systems as described in 7) and including:
    - A Reading and interpreting drawings related to cable layouts and apparatus locations.
    - B Placing and securing devices and accessories accurately.
    - C Maintaining fire integrity.
    - D Terminating cable and conductors correctly.
    - E Documenting installation.

- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling and setting up basic wired and wireless security systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE002A	Dismantle, assemble and fabricate electro technology components
UEENEEE005A	Fix and secure equipment

UEENEEE007A Use drawings, schedules and service manuals

UEENEEE008A Lay wiring and terminate accessories for extra-low voltage circuits

UEENEEF001A Assemble and maintain cabling for direct access to telecommunication services

The critical aspects of occupational health and safety covered in UEENEEE001A and other

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH051A Install large wired and wireless security systems

### Unit Descriptor

1)

This unit covers installing, entering instructions and testing of electronic security systems with in excess of 50 connected devices in buildings, premises and precincts. It encompasses working safely and to standards, following and job specifications, securely placing and connecting security system components, and applying customer relation protocols.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEH050A Assemble and set up basic wired and wireless security systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice of this unit in the work place is subject to State and Territory Security Industry regulations. Where the security system has a call-back-to-base facility practice in the workplace is also subject to ACA regulations to undertake cabling work.

Note:

Units 'UEENEEF001A and UEENEEF002A provide the required skill and knowledge for registration in accordance with ACA regulations for undertaking cabling work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to Install and set up basic wired and wireless security systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines.
- 1.2 Established OHS risk control measures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are reported and advise on risk control measures, are sought from the work supervisor.
- 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor or other appropriate person to ensure the work is co-ordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established routines.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Install basic wired and wireless security systems.

- 2.1 Established OHS risk control measures for carrying out the work are followed.
- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures

- |   |  |   |
|---|--|---|
|   | 2.3  | Security controllers and devices are located for optimum performance within limitation imposed by customers and regulations. (See note 1)   |
|   | 2.4  | Accessories are installed straight and square in the required locations and within acceptable tolerances.   |
|   | 2.5  | Cables and conductors are terminated at accessories in accordance with manufacture’s specifications and regulatory requirements.  |
|   | 2.6  | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.   |
|   | 2.7  | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   | 2.8  | Security installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices. |
| 3 | Set up basic wired and wireless security systems and document. | 3.1 OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2 Work site is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3 Security system is documented in accordance with regulatory requirement and established routines.   |

Note1:

Examples of security devices are, Reed switches, PIRs, Glass break facilities, Panic buttons, Monitored Door Strikes, Momentary Key Switches, Latching Key Switches, CCTVs, Monitors and Access panels.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing large wired and wireless security systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.9.59   | Closed circuit televisions                |
| 2.9.61   | Advanced security systems                 |
| 2.9.71.1 | Biometric devices                         |
| 2.18.1   | Occupational Health and Safety principles |
| 2.18.9   | Electronics Safe working practices        |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by installing at least two large security systems. Systems shall have controllers and more than 50 connected devices of five different types.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment

instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install large wired and wireless security systems as described in 7) and including:
    - A Reading and interpreting drawings related to cable layouts and apparatus locations.
    - B Placing and securing devices and accessories accurately.
    - C Maintaining fire integrity.
    - D Terminating cable and conductors correctly.
    - E Documenting installation.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing large wired and wireless security systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE008A	Lay wiring and terminate accessories for extra-low voltage circuits
UEENEEF001A	Install and maintain cabling for direct access to telecommunication services
UEENEEF002A	Lay and connect cables for multiple access to telecommunication services
UEENEEH050A	Assemble and set up basic wired and wireless security systems

The critical aspects of occupational health and safety covered in Unit E001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6; 2.7

## UEENEEH052A Enter instructions and test basic wired and wireless security systems

### Unit Descriptor

1)

This unit covers, entering instructions and testing electronic security systems with up to 50 connected devices typically used in single domestic and small commercial premises. It encompasses safe working practices, basic programming as directed in user manuals, adjusting security devices, system testing and following written and oral instruction and procedures and customer relations.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEEH050A Install basic wired and wireless security systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice of this unit in the work place is subject to State and Territory Security Industry regulations. Where the security system has a call-back-to-base facility practice in the workplace is also subject to ACA regulations to undertake cabling work.

Note:

Units UEENEEF001A and UEENEEF002A provide the required skill and knowledge for registration in accordance with ACA regulations for undertaking cabling work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to enter instructions and test basic security systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines.
- 1.2 Established OHS risk control measures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are reported and advise on risk control measures, are sought from the work supervisor.
- 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor or other appropriate person to ensure the work is co-ordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established routines.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Enter instructions and test basic wired and wireless security systems.

- 2.1 Established OHS risk control measures for carrying out the work are followed.
- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.3 Security devices are checked for correct location and alignment.
- 2.4 Security functions are entered into the system in accordance with manufacturer’s instructions.
- 2.5 Security system is tested in accordance with manufacturer’s instructions.
- 2.6 Security system operational malfunctions are identified and corrected.
- 2.7 Procedures for referring non-routine events to immediate supervisor for directions are followed.
- 2.8 Security program and testation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
- 3 Complete and document security systems set-up and testing.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Security system is documented in accordance with regulatory requirement and established routines.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and entering instructions, testing basic wired and wireless security systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.46 Security systems basic software functions and configurations
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronics Safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by enter instructions and testing at least two basic security systems. Systems shall consist of a controller and access device and at least two other

different connected device both wire and wireless.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Enter instructions and test basic wired and wireless security systems as described in 7) and including:
    - A Entering system instructions.
    - B Testing system functions.
    - C Identifying and correcting operational malfunctions.
    - D Documenting ‘as-installed’ system correctly.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in entering instructions, testing basic wired and wireless security systems.

### **Method of assessment**

#### **8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

### **Concurrent assessment and relationship with other units**

#### **8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH050A	Install basic wired and wireless security systems
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The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH053A Program and test large wired and wireless security systems

### Unit Descriptor

1)

This unit covers programming functions and testing electronic security systems with in excess of 50 connected devices in buildings, premises and precincts. It encompasses safe working practices, programming, adjusting security devices, system testing and following written and oral instruction and procedures and customer relations.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEEH054A Program and commission commercial security alarm systems

UEENEEH055A Program and commission commercial security access control systems

UEENEEH056A Program and commission commercial security closed circuit television (CCTV) systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical

work.

Practice of this unit in the work place is subject to State and Territory Security Industry regulations. Where the security system has a call-back-to-base facility practice in the workplace is also subject to ACA regulations to undertake cabling work.

Note:

Units ‘UEENEEF001A and UEENEEF002A provide the required skill and knowledge for registration in accordance with ACA regulations for undertaking cabling work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to program and test large security systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines.
- 1.2 Established OHS risk control measures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are reported and advise on risk control measures, are sought from the work supervisor.
- 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor or other appropriate person to ensure the work is co-ordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established routines.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

- |   |   |     |  |
|---|---|-----|--|
| 2 | Program and test large wired and wireless security systems.     | 2.1 | Established OHS risk control measures for carrying out the work are followed.  |
|   |   | 2.2 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |
|   |   | 2.3 | Security devices are checked for correct location and alignment.   |
|   |   | 2.4 | Security function codes are entered into the system in accordance with manufacturer’s instructions.  |
|   |   | 2.5 | Security system is tested in accordance with manufacturer’s instructions.  |
|   |   | 2.6 | Security system operational defects are identified and corrected.  |
|   |   | 2.7 | Procedures for referring non-routine events to immediate supervisor for directions are followed.   |
|   |   | 2.8 | Security program and testation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices. |
| 3 | Complete and document security systems programming and testing. | 3.1 | OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
|   |   | 3.3 | Security system is documented in accordance with regulatory requirement and established routines.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and programming, testing large wired and wireless security systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.47 Security systems programming methods
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronics Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by program and testing at least two large security system. Systems shall have controllers and more than 50 connected devices of five different types.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when

choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Program and test large wired and wireless security systems as described in 7) and including:
    - A Entering system instructions.
    - B Testing system functions.
    - C Identifying and correcting operational malfunctions.
    - D Documenting 'as-installed' system correctly.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in programming, testing large wired and wireless security systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH054A	Program and commission commercial security alarm systems
UEENEEH055A	Program and commission commercial security access control systems
UEENEEH056A	Program and commission commercial security closed circuit television (CCTV) systems

The critical aspects of occupational health and safety covered in UEENEEH001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH054A Program and commission commercial security alarm systems

### Unit Descriptor

1)

This unit covers installation and testing of security alarm system typically used in commercial buildings and premises. The unit encompasses working safely, following specifications and security access scenarios, programming security alarm functions, using circuit diagrams and schedules, and providing as-programmed document.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH052A Enter instructions and test basic wired and wireless security systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to program and commission.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of programming and commissioning is determined from reports and other documentation and fro discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to program and commission are obtained in accordance with established procedures and checked for correct operation and safety.

2 Program and commission.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |   |  |
|---|---|--|
|   | 2.4   | Security alarm functions and instructions are entered into the system in accordance with design specifications.  |
|   | 2.5   | Security alarm devices are checked for correct location and alignment.   |
|   | 2.6   | Security alarms are tested in accordance with commissioning requirements.  |
|   | 2.7   | Sources of alarm anomalies are identified and corrected.   |
|   | 2.8   | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.   |
|   | 2.9   | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |
|   | 2.10  | Programming and commissioning activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Complete and report programming and commissioning activities. |  |
|   | 3.1   | OHS work completion risk control measures and procedures are followed.   |
|   | 3.2   | Work site is made safe in accordance with established safety procedures.   |
|   | 3.3   | ‘As-installed’ security alarm system is documented and an appropriate person or persons notified in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and programming and commissioning commercial security alarm systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.4.48 | Security systems alarms programming       |
| 2.18.1 | Occupational Health and Safety principles |
| 2.18.9 | Electronics Safe working practices        |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by programming and commissioning at least two different commercial security alarm systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment

instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Program and commission commercial security alarm systems as described in 7) and including:
    - A Entering system functions.
    - B Testing system functions.
    - C Identifying and correcting function anomalies.
    - D Documenting 'as-installed' system correctly.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:  
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:  
Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in programming and commissioning commercial security alarm systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:  
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH053A	Program large wired and wireless security systems
UEENEEH055A	Program and commission commercial security access control systems
UEENEEH056A	Program and commission commercial security closed circuit television (CCTV) systems

The critical aspects of occupational health and safety covered in UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.7 to 2.9	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.8; 2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8; 2.9

## **UEENEEH055A Program and commission commercial security access control systems**

### **Unit Descriptor**

**1)**

This unit covers installation and testing of security access control system typically uses in commercial buildings and premises The unit encompasses working safely, following specifications and security access scenarios, programming security functions, using circuit diagrams and schedules, and providing as-programmed document.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH052A      Enter instructions and test basic wired and wireless security systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.</p>
<p>1 Prepare to program and commission.</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with appropriate personnel.</p> <p>1.4 The extent of programming and commissioning is determined from reports and other documentation and fro discussion with appropriate personnel.</p> <p>1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.</p> <p>1.6 Tools, equipment and testing devices needed to program and commission are obtained in accordance with established procedures and checked for correct operation and safety.</p>
<p>2 Program and commission.</p>	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p>

- 2.4 Security access control instructions and functions are entered into the system in accordance with design specifications.
  - 2.5 Security access control devices are checked for correct location and alignment.
  - 2.6 Security access controls are tested in accordance with commissioning requirements.
  - 2.7 Sources of access control anomalies are identified and corrected.
  - 2.8 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
  - 2.9 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
  - 2.10 Programming and commissioning activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report programming and commissioning activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 'As-installed' security access control system is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and programming and commissioning commercial security access control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.49.1 Security systems access control programming
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronics Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by programming and commissioning at least two different commercial security access control systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment

instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Program and commission commercial security access control systems as described in 7) and including:
    - A Entering system functions.
    - B Testing access control functions.
    - C Identifying and correcting function anomalies.
    - D Documenting 'as-installed' system correctly.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in programming and commissioning commercial security access control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH053A	Program large wired and wireless security systems
UEENEEH054A	Program and commission commercial security alarm systems
UEENEEH056A	Program and commission commercial security closed circuit television (CCTV) systems

The critical aspects of occupational health and safety covered in Unit E001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	1

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.7 to 2.9	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.8; 2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.8; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8; 2.9

## **UEENEEH056A Program and commission commercial security closed circuit television (CCTV) systems**

### **Unit Descriptor**

1)

This unit covers installation and testing of security CCTV systems typically used in commercial buildings and premises. The unit encompasses working safely, following specifications and security observation scenarios, programming security functions, using circuit diagrams and schedules, and providing as-programmed document.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH052A      Enter instructions and test basic wired and wireless security systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and

typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to program and commission

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of programming and commissioning is determined from reports and other documentation and fro discussion with appropriate personnel
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site
- 1.6 Tools, equipment and testing devices needed to program and commission are obtained in accordance with established procedures and checked for correct operation and safety.

2 Program and commission

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures

- |   |  |  |  |
|---|--|--|--|
|   | 2.4  | Security closed circuit television functions are entered into the system in accordance with design specifications.   |  |
|   | 2.5  | Security closed circuit television devices are checked for correct location and alignment.   |  |
|   | 2.6  | Security closed circuit televisions are tested in accordance with commissioning requirements.  |  |
|   | 2.7  | Sources of closed circuit television anomalies are identified and corrected.   |  |
|   | 2.8  | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.   |  |
|   | 2.9  | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |  |
|   | 2.10   | Programming and commissioning activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |  |
| 3 | Complete and report programming and commissioning activities | 3.1  | OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2  | Work site is made safe in accordance with established safety procedures.   |
|   |  | 3.3  | ‘As-installed’ security closed circuit television system is documented and an appropriate person or persons notified in accordance with established procedures |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and programming and commissioning commercial security closed circuit television (CCTV) systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.49.2 Security systems closed circuit television programming

2.18.1 Occupational Health and Safety principles

2.18.8.2 Occupational Health and Safety, enterprise responsibilities

2.18.9 Electronics Safe working practices

## **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by programming and commissioning at least two different commercial security closed circuit television systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### **Overview of Assessment**

#### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions

about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Program and commission commercial security closed circuit television (CCTV) systems as described in 7) and including:
    - A Entering system functions.
    - B Testing closed circuit television functions.
    - C Identifying and correcting function anomalies.
    - D Documenting ‘as-installed’ system correctly.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in programming and commissioning commercial security closed circuit television (CCTV) systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEH053A Program large wired and wireless security systems
- UEENEEH054A Program and commission commercial security alarm systems
- UEENEEH055A Program and commission commercial security access control systems

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.7 to 2.9	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.8; 2.9

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.8; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.8; 2.9

## **UEENEEH057A    Develop basic integrated security systems plan**

### **Unit Descriptor**

**1)**

This unit covers integrating security components to form a complete security system with up to 100 connected intrusion and access devices and based on common security scenarios. It encompasses applying knowledge of common security scenarios and security network standards and protocols, selecting network topology and physical media, disaster recovery planning, performance management and documentation of work activities.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH053A      Program and test large wired and wireless security systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 4 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

**4)**

## Electronics

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to develop integrated security systems	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the proposed integrated security system is determined from the system specification or in consultations with appropriate person(s)</p> <p>1.4 Development work is planned to meet scheduled timelines in consultation with others involved on the work site</p>
2 Develop integrated security system plan	<p>2.1 Knowledge of common security scenarios and security network standards and protocols, network topology, physical media and disaster planning is applied to the system plan.</p> <p>2.2 Alternative system arrangements are considered based on the requirements job specification.</p> <p>2.3 Safety, functional and budget considerations are incorporated in the system plan.</p> <p>2.4 System draft plan is checked for compliance with the job specifications and regulatory requirements.</p> <p>2.5 System plan is documented for submission to appropriate person(s) for approval</p> <p>2.6 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.</p>
3 Obtain approval for system plan	<p>3.1 System design is forwarded to client representative and/or other relevant person(s) for approval.</p> <p>3.2 Requests for alterations to the plan are negotiated with relevant person(s) in accordance with established procedures.</p> <p>3.3 Final system plan is documented and approval obtained from appropriate person(s).</p>

- 3.4 Quality of work is monitored against personal performance agreement.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing basic integrated security systems plan. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.78 Common security scenarios and solutions

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by planning two basic integrated security systems with up to 100 connected intrusion and access devices.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most

effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop basic integrated security systems plan as described in 7) and including:

- A Developing outlines of alternative system plan.
- B Developing the plan within the safety and functional requirements and budget limitations.
- C Documenting the plan effectively.
- D Obtaining approval for final plan.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing basic integrated security systems plan.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 2.6; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.4; 3.2; 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.6

## UEENEEH058A Design integrated security systems for a single site

### Unit Descriptor

1)

This unit covers integrating security components to form a security system with multiple and interrelated subsystems. It encompasses applying knowledge of security scenarios and security network standards and protocols, selecting network topology and physical media, disaster recovery planning, performance management and negotiating with clients and others and documenting design..

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH016A      Develop network services

UEENEEH057A      Develop basic integrated security systems plan

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT****PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to design integrated security systems	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the proposed integrated system is determined from the design brief or in consultations with appropriate person(s)</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site</p>
2 Develop integrated security system design	<p>2.1 Knowledge of security scenarios and security network standards and protocols, network topology, physical media and disaster planning is applied to the system design.</p> <p>2.2 Alternative arrangements for the system design are considered based on the requirements outlined in the design brief.</p> <p>2.3 Safety, functional and budget considerations are incorporated in the system design.</p> <p>2.4 System design draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.5 System design is documented for submission to appropriate person(s) for approval</p> <p>2.6 Solutions to unplanned situation are provided consistent with organisation policy.</p>
3 Obtain approval for system design	<p>3.1 System design is presented and explained to client representative and/or other relevant person(s).</p> <p>3.2 Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation policy.</p>

- 3.3 Final design is documented and approval obtained from appropriate person(s).
- 3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing integrated security systems for a single site. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.50.1 Integrated security systems
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by designing two integrated security systems with multiple and interrelated subsystems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design integrated security systems for a single site as described in 7) and including:
    - A Developing outlines of alternative system plan.
    - B Developing the design within the safety and functional requirements and budget limitations.
    - C Documenting and presenting design effectively.
    - D Successfully negotiating design alteration requests.
    - E Obtaining approval for final design.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing integrated security systems for a single site.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH059A Design integrated complex security systems

### Unit Descriptor

1)

This unit covers integrating security components to form a complex security system across multiple sites with multiple and related subsystems and remote monitoring and control. It encompasses applying knowledge of security scenarios and security network standards and protocols, selecting network topology and physical media, disaster recovery planning, performance management and negotiating with clients and others and documenting design.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH017A	Install and configure internetworking systems
UEENEEH058A	Design integrated security systems for a single site

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.3. Prerequisites

**Competency Field 4)**

Electronics

**ELEMENT****PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to design integrated complex security systems	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the proposed integrated system is determined from the design brief or in consultations with appropriate person(s)</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site</p>
2 Develop integrated complex security system design	<p>2.1 Knowledge of complex security scenarios and security network standards and protocols, network topology, physical media and disaster planning and remote monitoring and control is applied to the system design.</p> <p>2.2 Alternative arrangements for the system design are considered based on the requirements outlined in the design brief.</p> <p>2.3 Safety, functional and budget considerations are incorporated in the system design.</p> <p>2.4 System design draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.5 System design is documented for submission to appropriate person(s) for approval</p> <p>2.6 Solutions to unplanned situation are provided consistent with organisation policy.</p>
3 Obtain approval for system design	<p>3.1 System design is presented and explained to client representative and/or other relevant person(s).</p> <p>3.2 Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation policy.</p>

- 3.3 Final design is documented and approval obtained from appropriate person(s).
- 3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing integrated complex security systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.4.50.2 Internetworking security systems
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by designing one integrated complex security system that extends across multiple sites with remote monitoring and control.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design integrated complex security systems as described in 7) and including:
    - A This unit shall be demonstrated by designing one integrated complex security system that extends across multiple sites with remote monitoring and control.
    - B This unit shall be demonstrated by designing one integrated complex security system that extends across multiple sites with remote monitoring and control.
    - C This unit shall be demonstrated by designing one integrated complex security system that extends across multiple sites with remote monitoring and control.
    - D This unit shall be demonstrated by designing one integrated complex security system that extends across multiple sites with remote monitoring and control.
    - E This unit shall be demonstrated by designing one integrated complex security system that extends across multiple sites with remote monitoring and control.
    - F This unit shall be demonstrated by designing one integrated complex security system that extends across multiple sites with remote monitoring and control.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing integrated complex security systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6
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## UEENEEH060A Plan electronic projects

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers development and documentation of electronics project proposals, milestones and completions. The unit encompasses, establishing budgets, critical path analysis, development of workflow strategies, documenting, presenting and negotiating budgets and timelines.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      3      Writing      3      Numeracy      3
<b>Application of the Unit</b>	<b>3)</b>  This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 6 level or higher.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.
<b>Competency Field</b>	<b>4)</b>  Electronics

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to plan project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established techniques for project planning are reviewed are adopted in accordance with organisation's policies.</p> <p>1.3 The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).</p>
2 Develop project plan proposal.	<p>2.1 Estimated plant, material, labour and other costs are sought and obtained from appropriate person(s) in accordance with organisation's policies and procedures.</p> <p>2.2 Project budget is established from estimated plant, material, labour and other costs in accordance with organisation's policies and procedures.</p> <p>2.3 Knowledge of critical path analysis is applied to developing workflow strategies.</p> <p>2.4 Sources and availability of materials and human resources needed for the project are established in accordance with organisation's policies and procedures.</p> <p>2.5 Risk management strategies are sought and obtained for incorporating in the project plan.</p> <p>2.6 Project plan is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>2.7 Project plan proposal is documented in accordance with organisation's policies and procedures.</p>
3 Obtain approval for project plan.	<p>3.1 Project plan is presented and discussed with person(s) of higher authority.</p> <p>3.2 Alterations to the project plan resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.</p>

- 3.3 Final project plan is documented and approval obtained from appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and planning electronic projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.16.1 Project Planning
- 2.2.18 Critical path and project analysis
- 2.2.29 Electronics industry sector customs and practices
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to managing an industry accepted medium sized electronic project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan electronic projects as described in 7) and including:
    - A Determining the project requirements accurately.
    - B Establishing a project budget.
    - C Developing effective work flow strategies.
    - D Documenting project plan proposal.
    - E Negotiating alterations to the proposed project plan successfully.
    - F Obtaining approval of the final plan.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in planning electronic projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential

knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6: 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	3

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  1.6; 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.6 to 3.2	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 1.6; 3.1

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 1.7 to 3.2

## UEENEEH061A Position and terminate fire detection and warning system apparatus

### Unit Descriptor

1)

This unit covers installing electronic fire detection and warning systems in buildings and premises. It encompasses, working safely and to standards, following oral and written instructions and procedures, securely placing and connecting fire detection system and warning, components, and applying customer relation protocols.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEEE002A	Dismantle, assemble and fabricate electrotechnology components
UEENEEE005A	Fix and secure equipment
UEENEEE007A	Use drawings, schedules and service manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work. Where the fire alarm system has a call-back-to-base facility practice in the workplace is also subject to ACA regulations to undertake cabling work.

Note:

Unit 'UEENEEF002A' provides the required skill and knowledge for registration in accordance with ACA regulations for undertaking cabling work

Practice in the workplace and during training is also subject to

regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to assemble and set up basic fire detection and warning systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines.
- 1.2 Established OHS risk control measures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are reported and advise on risk control measures are sought from the work supervisor.
- 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor or other appropriate person to ensure the work is co-ordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are established in accordance with established routines.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

- |   |     |  |
|---|-----|--|
| 2 Assemble and set up basic fire detection and warning systems. | 2.1 | Established OHS risk control measures for carrying out the work are followed.  |
|   | 2.2 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |
|   | 2.3 | Fire protection controller and detection and warning devices are located for optimum performance within limitation imposed by customers and regulations.                                   |
|   | 2.4 | Accessories are installed straight and square in the required locations and within acceptable tolerances.  |
|   | 2.5 | Cables and conductors are terminated at accessories in accordance with manufacture’s specifications and regulatory requirements.   |
|   | 2.6 | Procedures for referring non-routine events to immediate supervisor for directions are followed.   |
|   | 2.7 | Fire protection installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices. |
| 3 Set up basic fire detection and warning systems.              | 3.1 | OHS work completion risk control measures and procedures are followed.   |
|   | 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
|   | 3.3 | Fire protection system is documented in accordance with regulatory requirement and established routines.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and positioning and terminating fire detection and warning system apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.5.21   | Technical standards, regulations and codes for fire protection and warning systems |
| 2.9.36   | Fire detection and warning system and apparatus fundamentals                       |
| 2.9.79.1 | Fire protection technologies   |

2.18.1 Occupational Health and Safety principles

2.18.11 Fire protection equipment safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by installing at least two-fire alarm and warning systems. Installation shall include the following system components:

- Fire alarm system with at least one Control & Indicating panel, 50 input devices, 5 output device and 2 system interface controls on at least of the following: Analogue addressable system, addressable system and or conventional system.
- Fire warning system with at least one Control & Indicating panel, 50 speakers, 5 interface communication devices and 2 warning indicators

Note:

1. Input devices can be conventional, analogue or analogue addressable fire detectors, flow switch connections or switch connections and the like.
2. Output devices can be shutdown signal, door or system release controls, solenoid valve controls and the like.
3. System interface controls can be communication signals to remote Control and indicating equipment, Building monitoring systems, paging system, Colour graphics and or the like.
4. Interface communication devices can be Warden Incommunication phones, Remote PA inputs and the like.
5. Warning Indicators are flashing lights for hearing impaired persons, fire brigade building indication and the like.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in

a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Position and terminate fire detection and warning system apparatus as described in 7) and including:
    - A Reading and interpreting drawings showing apparatus/device locations and connection arrangements.
    - B Placing and securing devices and accessories accurately.
    - C Maintaining fire integrity.
    - D Terminating cable and conductors correctly.
    - E Documenting installation.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in positioning and terminating fire detection and warning system apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE002A Dismantle, assemble and fabricate electrotechnology components
- UEENEEE005A Fix and secure equipment
- UEENEEE007A Use drawings, schedules and service manuals
- UEENEEE008A Install wiring and accessories for extra-low voltage circuits
- UEENEEF001A Install and maintain cabling for direct access to telecommunication services

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH062A **Verify compliance and functionality of fire protection installations**

**Unit Descriptor** 1)  
 This unit covers testing and visual inspection for verifying that a fire protection system and components are safe, and comply with requirements and functions as intended. It encompasses working safely, conducting compliance tests, conducting visual inspections, identifying non-compliance defects and mandatory reporting requirements.

**Prerequisite Unit(s)** 2)

**Competencies** 2.1)  
 Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH061A      Position and terminate fire detection and warning system apparatus

**Literacy and numeracy skills** 2.2)  
 Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading      3      Writing      3      Numeracy      3

**Application of the Unit** 3)  
 This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**Licence to practise** 3.1)  
 The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work. Where the fire alarm system has a call-back-to-base facility practice in the workplace is also subject to ACA regulations to undertake cabling work.

Note:  
 Unit ‘UEENEEF002A’ provides the required skill and knowledge for registration in accordance with ACA regulations for undertaking cabling work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to verify fire protection installations.

- 1.1 OHS procedures for a given work area are obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.5 Location of system components is determined from specifications and diagrams.
- 1.6 Inspection and tests are appropriately sequenced in accordance with job schedule.
- 1.7 Materials needed for the tests and verification are obtained in accordance with established procedures and checked against job requirements.
- 1.8 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety.

2 Visually inspect the installation.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.3 Cabling/wiring is checked for appropriate type and size.

- 2.4 Cabling/wiring, accessories and fire alarm warning components are validated as being suitably located, securely fixed and suitably protected from damage or corrosion.
  - 2.5 Accessories and components are validated as being appropriately rated and meeting functional requirements.
  - 2.6 Evidence that equipment complies with safety and functional requirements is cited.
  - 2.7 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
  - 2.8 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.9 Inspection is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Conduct tests.
- 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Back-to-base facilities and other system interfaces are isolated in accordance with established procedures.
  - 3.3 Testing or measuring on a live and operating system in strict accordance with OHS requirements and within established safety procedures.
  - 3.4 Circuits/machines/plant/other system interfaces are checked as being isolated to ensure the system is not activated during testing in strict accordance OHS requirements and procedures.
  - 3.5 Electrical tests are conducted to verify that the electrical circuit within the fire installation are safe and function as intended.
  - 3.6 System tests are conducted to verify that the fire protection equipment and cabling/wiring within the fire protection installation is safe and functions as intended.
  - 3.7 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.

- |   |  |  |
|---|--|--|
|   | 3.8  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   | 3.9  | Testing is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 4 | Report inspection and verification findings. |  |
|   | 4.1  | OHS work completion risk control measures and procedures are followed.   |
|   | 4.2  | Work site and equipment is cleaned and made safe in accordance with established procedures.  |
|   | 4.3  | Non-compliance defects are identified and reported in accordance with established procedures.  |
|   | 4.4  | Recommendations for rectifying defects are made in accordance with established procedures.   |
|   | 4.5  | Work completion is documented and an appropriate person or persons notified in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying compliance and functionality of fire protection installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |  |
|--|----------|--|
|  | 2.5.21   | Technical standards, regulations and codes for fire protection and warning systems |
|  | 2.7.5.3  | Fire protection installations, testing and verification methods                    |
|  | 2.9.36   | Fire detection and warning system and apparatus fundamentals                       |
|  | 2.9.37   | Fire alarm routine testing   |
|  | 2.9.79.1 | Fire protection technologies   |
|  | 2.18.1   | Occupational Health and Safety principles  |
|  | 2.18.11  | Fire protection equipment safe working practices                                   |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to at least two different new or existing fire protection installations and shall include:

The following components:

- Fire alarm system with at least 50 input devices, 20 output device and 2 system interface controls
- Fire warning system with at least 50 speakers, 5 interface communication devices and 2 warning indicators
- Voice message facilities

Note:

1. Input devices can be conventional, analogue or analogue addressable fire detectors, flow switch connections or switch connections and the like.
2. Output devices can be shutdown signal, door or system release controls, solenoid valve controls and the like.
3. System interface controls can be communication signals to remote Control and indicating equipment, Building monitoring systems, paging system, Colour graphics and or the like.
4. Interface communication devices can be Warden Incommunication phones, Remote PA inputs and the like.
5. Warning Indicators are flashing lights for hearing impaired persons, fire brigade building indication and the like.

Verification by:

- Visual inspection of cabling/wiring, accessories and controls
- Conducting electrical tests

Note:

1. Electrical testing includes isolation testing; insulation resistance of equipment; resistance of the internal circuits of equipment; polarity of supply and equipment; continuity of earthing; correct electrical connections load current.
2. Electrical testing may be limited by the scope permitted under restricted electrical work

- Conducting system tests as required by regulations

Note:

1. System testing includes weekly requirements to annual performance verification
2. Examples of tests are operation and control of indicating equipment, in-situ testing of detectors, taking sound measurements and the like

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Verify compliance and functionality of fire protection installations as described in 7) and including:
    - A Identifying visual defects.
    - B Conducting all electrical tests safely and correctly.
    - C Conducting all fire alarm and warning tests safely and correctly.
    - D Identifying non-compliant defects from test results.
    - E Recommending appropriate corrective actions.
    - F Acting within regulatory limits.
    - G Reporting legibly and accurately.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in verifying compliance and functionality of fire protection installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.3 to 2.6; 3.4; 3.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 3.4; 3.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 4.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.4; 3.5	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3 to 4.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.8; 2.1; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 2.8; 3.7; 3.8

## **UEENEEH063A Enter and verify programs in preparation for commissioning fire protection systems**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers programming fire protection systems that include multiple connected detection, warning and fire control devices and remote monitoring. It encompasses working safely, applying knowledge of fire protection scenarios, using fire protection standards and protocols, entering system instructions, testing functionality of fire protection components and system operation, and documentation of commissioning activities.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEH062A    Verify compliance and functionality of fire protection installations</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p> <p style="margin-left: 40px;">Note:1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing</p>						

tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to enter operating instructions.

1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.

1.2 Established OHS risk control measures and procedures are followed in preparation for the work.

1.3 Safety hazards that have not previously been identified are reported and advise on risk control measures are sought from the work supervisor.

1.4 The extent of programming work is determined from job specifications and in consultation with appropriate person(s).

1.5 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

1.6 Device installation is checked for compliance with job specification and regulations where they apply.

2 Enter software operating instructions.

2.1 Established OHS risk control measures and procedures for carrying out the work are followed.

2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures

2.3 The required status of each function of the device is entered and their parameters set in accordance manufactures programming instructions.

2.4 Entered data are checked as meeting those specified by the work job specification.

	2.5	Methods for dealing with unexpected situations are decided on the basis of safety and required work outcomes.	
	2.6	Programming is carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or other services.	
3	Test device operation and report.	3.1	Device operation is tested in strict accordance OHS requirements and procedures.
		3.2	Operating anomalies are identified and corrected in accordance with established routines.
		3.3	OHS work completion risk control measures and procedures are followed.
		3.4	Work site is cleaned and made safe in accordance with established procedures.
		3.5	Work completion is reported and an appropriate person or persons notified in accordance with established routines.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying programs in preparation for commissioning fire protection systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.4.51	Fire protection system programming methods
2.18.1	Occupational Health and Safety principles
2.18.11	Fire protection equipment safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to entering and verifying programs in preparation for commissioning fire protection systems in at least two types of microprocessor fire protection control and indicating equipment. Programming shall include the following parameters:

- At least 50 input devices
- At least 20 output device

- At least 1 system interface control
- At least 2 logic timers
- System variables

Note:

1. Input devices can be conventional alarm zones, analogue or analogue addressable fire detectors, flow switch connections or switch connections and the like.
2. Output devices can be shutdown signal, door or system release controls, solenoid valve controls and the like.
3. System interface controls can be communication signals to remote Control and indicating equipment, Building monitoring systems, paging system, Colour graphics and or the like.
4. Logic times can be software programs that control the operation of non-latching detectors, timer periods before operation of fire system suppression systems and or the like.
5. System variables can be standard software functions that operate AS 1668 smoke detector controls, dual zone alarm configurations, alarm and fault global functions and the like.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical

equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria & range
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies & workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Enter and verify programs in preparation for commissioning fire protection systems as described in 7) and including:
    - A Understanding required operating functions and parameters.
    - B Identifying non-compliance conditions of device installation.

- C Entering functions and parameters correctly.
- D Correcting programming anomalies.
- E Testing and verify device operation.
- F Program backups, version controls and documentation.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in entering and verifying programs in preparation for commissioning fire protection systems

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**with other units**

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: NA	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: NA	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 3.2	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.2	1

**Skills Enabling 8.7)**

**Employment**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.5; 3.2; 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH064A Commission commercial fire protection systems

### Unit Descriptor

1)

This unit covers commissioning fire protection systems that include multiple connected detection, warning and fire control devices and remote monitoring. It encompasses working safely, applying knowledge of fire protection scenarios, using fire protection standards and protocols, entering system instructions, testing functionality of fire protection components and system operation, and documentation of commissioning activities.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH063A Enter and verify programs in preparation for commissioning fire protection systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to commission.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of commissioning is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to program and commission are obtained in accordance with established procedures and checked for correct operation and safety.

2 Commission fire protection systems.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |   |  |
|---|---|--|
|   | 2.4   | Fire protection system components are verified as complying with design specifications and regulations.  |
|   | 2.5   | Fire protection devices are checked for correct location and alignment.  |
|   | 2.6   | Fire protection functions are tested in accordance with commissioning requirements.  |
|   | 2.7   | Sources of fire protection system anomalies are identified and corrected.  |
|   | 2.8   | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.   |
|   | 2.9   | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |
|   | 2.10  | Commissioning activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Complete and report programming and commissioning activities. | 3.1 OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2 Work site is made safe in accordance with established safety procedures.   |
|   |   | 3.3 'As-installed' fire protection system is documented and an appropriate person or persons notified in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and commissioning commercial fire protection systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.9.79.2 | Fire protection systems, commissioning process   |
| 2.18.1   | Occupational Health and Safety principles        |
| 2.18.11  | Fire protection equipment safe working practices |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to commissioning at least two different fire alarms and warning systems. Commissioning shall include the following system components:

- Fire alarm system with at least 50 input devices, 20 output device and 2 system interface controls
- Fire warning system with at least 50 speakers, 5 interface communication devices and 2 warning indicators.
- Voice message facilities

Note:

1. Input devices can be conventional, analogue or analogue addressable fire detectors, flow switch connections or switch connections and the like.
2. Output devices can be shutdown signal, door or system release controls, solenoid valve controls and the like.
3. System interface controls can be communication signals to remote Control and indicating equipment, Building monitoring systems, paging system, Colour graphics and or the like.
4. Interface communication devices can be Warden Incommunication phones, Remote PA inputs and the like.
5. Warning Indicators are flashing lights for hearing impaired persons, fire brigade building indication and the like.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most

effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Commission commercial fire protection systems as described in 7) and including:

- A Identifying the extent of the fire protection system.
- B Verify compliance of components.
- C Testing system functionality.
- D Identifying and correcting function anomalies.
- E Documenting ‘as-installed’ system correctly.
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in commissioning commercial fire protection systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.7 to 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.8; 2.9

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.8; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.8; 2.9

## **UEENEEH065A Find and repair faults in fire protection systems**

### **Unit Descriptor**

**1)**

This unit covers fault finding and repair of fire protection systems that include multiple connected detection, warning and fire control devices and remote monitoring to the sub-assembly level. The unit encompasses safe working practices, interpreting circuit diagrams, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH064A Commission commercial fire protection systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant/system interfaces are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.

- 2.5 Fault finding is approached methodically drawing on knowledge of fire protection systems and components using measured values of system parameters.
  - 2.6 System components are dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.7 Faulty system/components are rechecked and their fault status and confirmed.
  - 2.8 Materials/replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.
  - 2.9 Effectiveness of the repair is tested in accordance with established procedures.
  - 2.10 Apparatus is reassembled, finally tested and prepared for return to service.
  - 2.11 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.12 Fault finding and repair activities are carried out without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault finding and repair activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.
  - 3.3 Fault finding and repair work activities are documented in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in fire protection systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.3 Fault finding techniques
- 2.2.4 Problem solving techniques
- 2.9.79.3 Fire protection systems' faults

- 2.18.1 Occupational Health and Safety principles
- 2.18.11 Fire protection equipment safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

Both a fire alarm and warning systems that include at least the following system components:

- Fire alarm system with at least 50 input devices, 20 output device and 2 system interface controls
- Fire warning system with at least 50 speakers, 5 interface communication devices and 2 warning indicators.
- Voice message facilities

Note:

1. Input devices can be conventional, analogue or analogue addressable fire detectors, flow switch connections or switch connections and the like.
2. Output devices can be shutdown signal, door or system release controls, solenoid valve controls and the like.
3. System interface controls can be communication signals to remote Control and indicating equipment, Building monitoring systems, paging system, Colour graphics and or the like.
4. Interface communication devices can be Warden Incommunication phones, Remote PA inputs and the like.
5. Warning Indicators are flashing lights for hearing impaired persons, fire brigade building indication and the like.

Finding and repairing any six of the following faults in fire alarm and warning systems:

- Open-circuit
- Short-circuit
- Incorrect connections
- Insulation failure
- Program failure
- Apparatus/component failure
- Related mechanical failure
- Electrical induced interference

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in fire protection systems as described in 7) and including:
    - A Envisaging the likely extent of work from fault/breakdown reports and discussion with appropriate person(s).
    - B Using methodical fault finding techniques.
    - C Finding faults efficiently.
    - D Rectifying faults effectively.
    - E Completing documentation correctly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in fire protection systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3;	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2

**Skills Enabling  
Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEH066A **Fault find Microcontroller based hardware**

### **Unit Descriptor**

1)

This unit covers determining correct operation of microcontroller hardware and firmware. It encompasses working safely, problem solving procedures, providing solutions derived from measurements and calculations to predictable faults in microcontroller hardware and firmware.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

There are no pre-requisites recommended for this unit.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work

environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on microcontroller hardware and firmware.

1.1 OHS procedures for a given work area are obtained and understood.

1.2 OHS risk control work preparation measures and procedures are followed.

1.3 The nature of microcontroller hardware and firmware problems is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.

1.5 Sources of materials that may be required for the work are established in accordance with established procedures.

1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve microcontroller hardware and firmware problems.

2.1 OHS risk control work measures and procedures are followed.

2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

2.4 Established methods are used to solve problems from measure and calculated values as they apply to microcontroller hardware and firmware in an electronic apparatus.

	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3	Complete work and document problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and fault finding Microcontroller based hardware. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.5.2	Microcontroller fundamentals
2.9.12	Electronic fault finding
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving at least two of the following types microcontroller hardware and firmware problems:

- Determining the operating parameters of microcontroller hardware and firmware of an electronic apparatus
- Modifying an existing microcontroller hardware and firmware to comply with specified operating parameters
- Developing microcontroller based hardware and firmware to comply with a specified function and operating parameters
- Finding and repairing a basic fault in microcontroller hardware

and firmware of an electronic apparatus

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Fault find Microcontroller based hardware as described in 7) and including:
    - A Using methodical problem solving methods.
    - B Taking measurements correctly and accurately.
    - C Calculating parameters correctly and accurately.
    - D Providing solution to digital component/circuit problems.
    - E Providing written justification for the solutions to problems.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and 8.3)**

**specific resources for assessment**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in fault finding Microcontroller based hardware.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEH002A Carry out basic repairs to electronic equipment
- UEENEEH012A Find and repair faults in the digital components in electronic apparatus
- UEENEEH013A Find and repair faults in the amplifier sections of electronic apparatus
- UEENEEH016A Find and repair faults in the microwave amplifier sections in electronic apparatus

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## **UEENEEH070A Terminate and connect components, conductors, wiring and cables for electronic circuits**

### **Unit Descriptor**

1)

This unit covers the implementation, performance and evaluation of component connections and terminations of conductors, wiring, cables, and other recognised mediums. It encompasses implementing reliable termination and connection processes, working to specifications, safe use of connection and termination tools, safe use of termination and/or soldering devices, selection and placement of components, termination and connection preparation, termination and connection techniques, and evaluating termination and connection work.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electro technology components

UEENEEE007A Use drawings, schedules and service manuals

AND

UEENEEG012A Solve fundamental problems in electrical systems

OR

UEENEEG049A Solve problems in complex polyphase power circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit shall apply to persons entering work in electro technology and may be used in school based vocational programs.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to implement connection/termination processes that include components, conductors, wiring and cables for electronic circuits.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are reported and advise on risk control measures, are sought from the work supervisor.
- 1.4 The scope and nature of work to be undertaken is determined from documentation and instructions from work supervisor.
- 1.5 An implementation and work plan is developed to ensure the work is co-ordinated effectively with others.
- 1.6 Materials required for the work are obtained in accordance with established routines and procedures.

		1.7	Tools, equipment, measuring and termination and connection devices needed to carry out the work are obtained and checked for correct operation and safety.
2	Connect/terminate components, conductors, wiring and cables.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Components and connection/termination methods and devices are selected in accordance with their specified type and rating. (See Note 1)
		2.3	Components and conductors are placed in accordance with specification/drawing and correct polarity.
		2.4	Terminations and connections are prepared in accordance to ensure reliability of connections in accordance with industry standards. (See Note 2)
		2.5	Termination and connections are made using devices and techniques that comply with manufacturer's requirements and industry standards.
		2.6	Procedures for identifying and responding to non-routine events including defects are coordinated and actioned in accordance with established procedures.
		2.7	Connection/termination activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3	Evaluate completed connections and terminations of components, conductors, wiring and cables.	3.1	Established OHS risk control measures and procedures for carrying out the work are followed.
		3.2	Defects in component placement, connections and terminations are identified by visual inspection and recorded.
		3.3	Solutions to non-compliant work are developed and responded to in accordance with established procedures and requirements
		3.4	Connections and terminations are performance tested for compliance with the specified Standard and non-compliance performance characteristics identified and recorded.
		3.5	Rework is carried out to rectify defects and non-compliant performance characteristics to manufacturer's requirements and industry standards. (See Note 3)

	3.6	Connections and terminations are confirmed compliant with established procedures and requirements
4 Complete and document connections and terminations activities.	4.1	OHS risk control work completion measures and procedures are followed.
	4.2	Work site is cleaned and made safe in accordance with established procedures.
	4.3	Evaluation documentation confirming compliance of the connections and terminations is verified in accordance with established procedures and requirements
	4.4	Inspection, testing, and rectification work is documented in accordance with established procedures.

Notes.

1. Connections methods include crimping, soldering and use of vendor specific devices.
2. Preparation includes sheath and insulation stripping and approved cleaning methods.
3. Rework may include the application of desoldering techniques

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and terminating and connecting components, conductors, wiring and cables for electronic circuits. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.1.4	Basic cable and conductor terminations
2.1.8	Electronic cable and conductor terminations
2.9.1.1	Electronic component basics
2.11.5	Basic electrical testing and measuring devices and techniques
2.11.11.1	Electronic soldering equipment and techniques
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to terminating and connecting components, conductors, wiring and cables for electronic circuits. This shall include:

- Selection and placement of at least five different types of electronic components.
- Connection of electronic components by soldering.
- Termination and connection of a coaxial cable.
- Termination and connection of a high performance copper cable.
- Termination of an insulated cable by using a crimped connection.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when

choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Terminate and connect components, conductors, wiring and cables for electronic circuits as described in 7) and including:
    - A Developing implementation and work plan
    - B Selecting components and termination and connection devices in accordance with their specified type and ratings.
    - C Placing components correctly.
    - D Preparing terminations and connections correctly.
    - E Making reliable terminations and connections in accordance with industry standards.

- F Identifying defects and non-compliant performance
- G Rectifying defects and non-compliant performance characteristics to requirements.
- H Evaluating reliability of termination and connection work
- I Providing solutions for non-compliant work
- J Documenting termination and termination activities accurately
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in terminating and connecting components, conductors, wiring and cables for electronic circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE002A Dismantle, assemble and fabricate electro technology components

UEENEEE007A Use drawings, schedules and service manuals

AND

UEENEEG012A Solve fundamental problems in electrical systems

OR

UEENEEG049A Solve problems in complex polyphase power circuits

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.7	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas	Refer to the following Performance Criteria for examples of application:	

and techniques used?	2.3; 2.4	1
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How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  NA	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5; 3.3; 3.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2; 3.3; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH071A Find and repair faults in television receivers

### Unit Descriptor

1)

This unit covers fault finding and repair of faults in signal processing and scanning and deflection sections of television receivers. The unit encompasses safe working practices, interpreting circuit diagrams, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH019A Carry out repairs of predictable faults in television receivers

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Fault finding is approached methodically drawing on knowledge of chrominance and luminance signal processing and scanning and deflection sections of television receivers using measured and calculated values of apparatus parameters.
- 2.5 Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.
- 2.6 Faulty components are rechecked and their fault status confirmed.
- 2.7 Materials/replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.
- 2.8 Effectiveness of the repair is tested in accordance with established procedures.
- 2.9 Apparatus is reassembled, finally tested and prepared for return to service.
- 2.10 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.11 Fault finding activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Repair fault.
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 3.3 Materials required for the repair work are sourced and obtained in accordance with established procedures.
  - 3.4 Repairs are affected efficiently without damage to other components, apparatus or circuits.
  - 3.5 Effectiveness of the repair is tested in accordance with established procedures.
  - 3.6 Apparatus is reassembled, finally tested and prepared for return to customer.
- 4 Completion and report fault finding and repair activities.
  - 4.1 OHS work completion risk control measures and procedures are followed.

- 4.2 Work area is cleaned and made safe in accordance with established procedures.
- 4.3 Written justification is made for repairs to apparatus.
- 4.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in television receivers. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.29 Television scanning and deflection
- 2.9.30 Television chrominance and luminance
- 2.9.31.2 Power supplies for TVs and VCRs
- 2.9.31.3 Television RF Stages
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing faults in signal processing and scanning and deflection sections of television receivers.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of 8.1)

## Assessment

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this unit

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in television receivers as described in 7) and including:
    - A Using methodical fault finding techniques.
    - B Finding faults efficiently.
    - C Replacing components without damage.
    - D Providing written justification for the repairs.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in television receivers.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.6; 3.5; 3.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.6



## UEENEEH072A Find and repair faults in the RF sections of electronic apparatus

### Unit Descriptor

1)

This unit covers fault finding and repair of radio frequency sections in electronic apparatus. The unit encompasses safe working practices, interpreting circuit diagrams, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A Solve problems in digital components of electronic apparatus

UEENEEH013A Solve problems in amplifier sections of electronic apparatus

UEENEEH038A Find and repair faults in complex power supplies

UEENEEH046A Solve fundamental problems in electronic communications systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.

- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 2 Find faults
  - 2.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
  - 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Fault finding is approached methodically drawing on knowledge of radio frequency sections and circuit using measured and calculated values of apparatus parameters.
  - 2.5 Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.6 Faulty components are rechecked and their fault status confirmed.
  - 2.7 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.8 Fault finding activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Repair fault.
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 3.3 Materials required for the repair work are sourced and obtained in accordance with established procedures.
  - 3.4 Repairs are affected efficiently without damage to other components, apparatus or circuits.
  - 3.5 Effectiveness of the repair is tested in accordance with established procedures.

- |   |  |   |
|---|--|---|
|   | 3.6                                      | Apparatus is reassembled, finally tested and prepared for return to customer. |
| 4 | Completion and report repair activities. | 4.1 OHS work completion risk control measures and procedures are followed.    |
|   | 4.2                                      | Work area is cleaned and made safe in accordance with established procedures. |
|   | 4.3                                      | Written justification is made for repairs to apparatus.                       |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in television receivers. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |   |
|--|----------|---|
|  | 2.9.9.2  | Amplifier applications                                  |
|  | 2.9.39   | AM and FM tuners  |
|  | 2.10.3   | Electronic communications, modulation                   |
|  | 2.10.4   | Electronic communications, modulation circuits          |
|  | 2.10.5   | Electronic communications, receivers                    |
|  | 2.10.6   | Electronic communications, transmitters                 |
|  | 2.11.7.1 | Electronic testing and measuring devices and techniques |
|  | 2.18.1   | Occupational Health and Safety principles               |
|  | 2.18.9   | Electronic safe working practices                       |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing faults in the radio frequency sections in at least two types of electronic apparatus.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in television receivers as described in 7) and including:
    - A Using methodical fault finding techniques.
    - B Finding faults efficiently.
    - C Replacing components without damage.
    - D Providing written justification for the repairs.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in television receivers.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- |             |  |
|-------------|--|
| UEENEEH011A | Find and repair faults in the power supplies of electronic apparatus               |
| UEENEEH012A | Find and repair faults in the digital components in electronic apparatus           |
| UEENEEH013A | Find and repair faults in the amplifier sections of electronic apparatus           |
| UEENEEH016A | Find and repair faults in the microwave amplifier sections of electronic apparatus |
| UEENEEH046A | Solve fundamental problems in electronic communications systems                    |

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.4	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.6	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.5; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH073A Find and repair faults in professional audio reproduction components

### Unit Descriptor

1)

This unit covers fault finding and repair of professional and high-end audio amplifiers, preamplifiers, receivers, graphic equalizers, speakers and the like. The unit encompasses safe working practices, interpreting circuit diagrams, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH024A Carry out repairs of predictable faults in audio components

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as

apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults.

- 1.1 OHS procedures for a given work area are obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Fault finding is approached methodically drawing on knowledge of audio reproduction components and circuits using measured and calculated values of apparatus parameters.
- 2.5 Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage
- 2.6 Faulty components are rechecked and their fault status confirmed.
- 2.7 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.8 Fault finding activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Repair fault.
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 3.3 Materials required for the repair work are sourced and obtained in accordance with established procedures.
  - 3.4 Repairs are affected efficiently without damage to other components, apparatus or circuits.
  - 3.5 Effectiveness of the repair is tested in accordance with established procedures.
  - 3.6 Apparatus is reassembled, finally tested and prepared for return to customer.
- 4 Completion and report repair activities.
  - 4.1 OHS work completion risk control measures and procedures are followed.
  - 4.2 Work area is cleaned and made safe in accordance with established procedures.
  - 4.3 Written justification is made for repairs to apparatus.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in professional audio reproduction components. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.16.1 Sound reproduction fundamentals
- 2.9.17.1 Audio reproduction, electronic components
- 2.9.45.1 Audio electronics
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing four different faults in two different components of audio equipment.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most

effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies & workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in professional audio reproduction components as described in 7) and including:

- A Using methodical fault finding techniques.
- B Finding faults efficiently.
- C Replacing components without damage.
- D Providing written justification for the repairs.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in professional audio reproduction components.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.6; 3.5; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH074A Find and repair faults in audio/video recording equipment

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers fault finding and repair of ACR, CD, VCR and DVD players/recorders. The unit encompasses safe working practices, interpreting circuit diagrams, applying logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEH017A Carry out repairs of predictable faults in audio and video replay/recording apparatus</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'</p> <table border="0" style="width: 100%;"> <tr> <td>Reading</td> <td style="text-align: center;">4</td> <td>Writing</td> <td style="text-align: center;">4</td> <td>Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.</p> <p>Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as</p>						

apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |  |  |
|---|--|--|
|   | 2.4                                      | Fault finding is approached methodically drawing on knowledge of audio/video recording and replay components and circuits using measured and calculated values of apparatus parameters.    |
|   | 2.5                                      | Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.   |
|   | 2.6                                      | Faulty components are rechecked and their fault status confirmed.  |
|   | 2.7                                      | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   | 2.8                                      | Fault finding activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Repair fault.                            |  |
|   | 3.1                                      | OHS risk control measures and procedures for carrying out the work are followed.   |
|   | 3.2                                      | Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.   |
|   | 3.3                                      | Materials required for the repair work are sourced and obtained in accordance with established procedures.   |
|   | 3.4                                      | Repairs are affected efficiently without damage to other components, apparatus or circuits.  |
|   | 3.5                                      | Effectiveness of the repair is tested in accordance with established procedures.   |
|   | 3.6                                      | Apparatus is reassembled, finally tested and prepared for return to customer.  |
| 4 | Completion and report repair activities. |  |
|   | 4.1                                      | OHS work completion risk control measures and procedures are followed.   |
|   | 4.2                                      | Work area is cleaned and made safe in accordance with established procedures.  |
|   | 4.3                                      | Written justification is made for repairs to apparatus.  |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing in audio/video recording equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.51	Camcorders
2.9.52	Digital versatile disk processors
2.9.53	Compact disc players
2.9.54	VCR basic principles
2.9.55	VCR fault finding
2.9.56	VCR advanced principles
2.18.1	Occupational Health and Safety principles
2.18.9	Electronic safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and repairing four different faults in two different audio/video record and replay components

Note:

Examples of faults are.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in audio/video recording equipment as described in 7) and including:
    - A Using methodical fault finding techniques.
    - B Finding faults efficiently.
    - C Replacing components without damage.
    - D Providing written justification for the repairs..
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in audio/video recording equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential

knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.4	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.6	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.5; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEH075A Find and rectify faults and malfunctions in security system installations**

### **Unit Descriptor**

1)

This unit covers fault finding and repair of security system installations. The unit encompasses safe working practices, interpreting circuit diagrams, applying knowledge of security systems to logical fault finding procedures, rectifying faults/malfunctions, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH053A Program large wired and wireless security systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and rectify faults and malfunctions.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and rectify faults and malfunctions.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Fault finding is approached methodically drawing on knowledge of security systems, circuits and diagnostic tools.
  - 2.5 Faulty security cables or terminations are identified, their fault status confirmed and repair or replace in accordance with established procedures.
  - 2.6 Faulty or malfunctioning security devices are identified, their fault status confirmed and readjusted or replace in accordance with established procedures.
  - 2.7 Malfunctions in security system software are identified and rectified following established routine procedures.
  - 2.8 Effectiveness of the repaired component is tested in accordance with established procedures.
  - 2.9 Apparatus is reassembled, finally tested and prepared for return to customer.
  - 2.10 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.11 Fault finding and repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault finding and rectification activities.
    - 3.1 OHS work completion risk control measures and procedures are followed.
    - 3.2 Work area is cleaned and made safe in accordance with established procedures.
    - 3.3 Written justification is made for repairs to apparatus including components and materials used.
    - 3.4 Acceptance that the reported fault(s) have been repaired is sought from an appropriate person in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and rectifying faults and malfunctions in security system installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.41.2 Security systems installation faults

2.18.1 Occupational Health and Safety principles

2.18.9 Electronics Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to finding and rectify at least four faults/malfunctions in two different of security systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria & range
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and rectify faults and malfunctions in security system installations as described in 7) and including:

- A Using methodical fault finding techniques.
- B Finding faults/malfunctions efficiently.
- C Rectifying faults/malfunctions effectively.
- D Providing written justification for the rectification work.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and rectifying faults and malfunctions in security system installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling 8.7)**

**Employment**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.10

## UEENEEH076A **Diagnose and rectify faults in display circuits**

### **Unit Descriptor**

1)

This unit covers fault finding and repair of faults in cathode ray tubes, liquid crystal and plasma display circuits. The unit encompasses safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of display circuit components, rectifying faults, safety and functional testing and completing the necessary service documentation..

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH071A Find and repair faults in television receivers

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Logical diagnostic methods are applied to diagnose display circuits faults employing measurements of circuit operating parameters referenced to display operating specifications.
  - 2.5 Suspected fault scenarios are tested as being the source of display circuit problems.
  - 2.6 Faults in the electronic components of the display circuits are rectified to raise display circuits to its operation standard.
  - 2.7 Circuits are tested to verify that the display operates as intended and to specified requirements.
  - 2.8 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and consistent with job specifications and requirements.
  - 2.9 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that display circuit faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in display circuits. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.24 Cathode ray tube displays
- 2.9.25 Plasma displays
- 2.9.26.1 Liquid crystal displays
- 2.9.26.2 Display circuit diagnostics
- 2.11.7.2 Advanced electronic testing and measuring devices and techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities
- 2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four circuit faults in two different types of display.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best

utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with

- the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Diagnose and rectify faults in display circuits as described in 7) and including:
      - A Applying logical diagnostic methods.
      - B Using fault scenarios to test the source of circuit faults.
      - C Identifying the cause faults using logical diagnostic methods.
      - D Rectifying faults effectively.
      - E Verifying that the display operates correctly.
      - F Documenting fault rectification.
      - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in

display circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: all
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4; 2.1 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9
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## UEENEEH077A Diagnose and rectify faults in recording and replay apparatus

### Unit Descriptor

1)

This unit covers fault finding and repair of faults in SACD, DVD and DVDA recording and replay apparatus. The unit encompasses safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of recording and replay apparatus components, rectifying faults, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH074A Find and repair faults in audio/video recording equipment

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as

apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

1.1 OHS procedures for a given work area are obtained and understood.

1.2 Established OHS risk control measures and procedures are followed in preparation for the work.

1.3 Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with appropriate personnel.

1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.

1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.

1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

2.1 OHS risk control measures and procedures for carrying out the work are followed.

2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Logical diagnostic methods are applied to diagnose recording and replay apparatus faults employing measurements of circuit operating parameters referenced to recording and replay apparatus operating specifications.
- 2.5 Suspected fault scenarios are tested as being the source of recording and replay apparatus problems.
- 2.6 Faults in the electronic components of the recording and replay apparatus are rectified to raise recording and replay apparatus to its operation standard.
- 2.7 Apparatus are tested to verify that they operate as intended and to specified requirements.
- 2.8 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and consistent with job specifications and requirements.
- 2.9 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that recording and replay apparatus faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in recording and replay apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.45.2	Recording and replay apparatus diagnostics
2.11.7.2	Advanced electronic testing and measuring devices and techniques
2.18.1	Occupational Health and Safety principles
2.18.8.2	Occupational Health and Safety, enterprise responsibilities
2.18.9	Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four circuit faults in two different types of recording and replay apparatus.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in

some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies & workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in recording and replay apparatus as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the source of apparatus faults.
    - C Identifying the cause faults using logical diagnostic methods.
    - D Rectifying faults effectively.
    - E Verifying that the recording and replay apparatus operates correctly.
    - F Documenting fault rectification.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in recording and replay apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4; 2.1 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.9

## UEENEEH078A Diagnose and rectify faults in camera circuits

### Unit Descriptor

1)

This unit covers fault finding and repair of faults in camera circuits. The unit encompasses safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of camera circuit components, rectifying faults, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH018A Find and repair faults in electronic apparatus

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- |   |   |  |
|---|---|--|
|   | 2.4   | Logical diagnostic methods are applied to diagnose camera circuit's faults employing measurements of circuit operating parameters referenced to camera operating specifications.                         |
|   | 2.5   | Suspected fault scenarios are tested as being the source of camera circuit problems.   |
|   | 2.6   | Faults in the electronic components of the camera circuits are rectified to raise camera circuits to its operation standard.   |
|   | 2.7   | Circuits are tested to verify that the camera operates as intended and to specified requirements.  |
|   | 2.8   | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and consistent with job specifications and requirements.   |
|   | 2.9   | Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Complete and report fault diagnosis and rectification activities. |  |
|   | 3.1   | OHS work completion risk control measures and procedures are followed.   |
|   | 3.2   | Work site is made safe in accordance with established safety procedures.   |
|   | 3.3   | Rectification of faults is documented in accordance with established procedures.   |
|   | 3.4   | Appropriate person or persons notified, in accordance with established procedures, that camera circuit faults have been rectified.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in camera circuits. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

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|----------|--|
| 2.9.32.1 | Camcorders and digital cameras             |
| 2.9.32.2 | Camera circuits diagnostics                |
| 2.18.1   | Occupational Health and Safety principles  |
| 2.18.8.2 | Occupational Health and Safety, enterprise |

responsibilities

2.18.9 Electronic Safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four circuit faults in two different types of camera.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational

requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in camera circuits as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the source of circuit faults.
    - C Identifying the cause faults using logical diagnostic methods.
    - D Rectifying faults effectively.
    - E Verifying that the camera operates correctly.

- F Documenting fault rectification.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in camera circuits.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key**

**8.6)**

**competencies**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.1 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9

## UEENEEH079A **Diagnose and rectify faults in digital television apparatus**

### **Unit Descriptor**

1)

This unit covers fault finding and repair of faults in digital television apparatus. The unit encompasses safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of digital television apparatus circuit components, rectifying faults, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH076A Diagnose and repair faults in display circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Logical diagnostic methods are applied to diagnose digital television apparatus faults employing measurements of circuit operating parameters referenced to apparatus operating specifications.
  - 2.5 Suspected fault scenarios are tested as being the source of apparatus problems.
  - 2.6 Faults in the electronic components of the digital television apparatus are rectified to raise digital television apparatus to its operation standard.
  - 2.7 Circuits are tested to verify that the apparatus operates as intended and to specified requirements
  - 2.8 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and consistent with job specifications and requirements.
  - 2.9 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that apparatus faults have been rectified

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in digital television apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.34.1 Digital television receivers
- 2.9.34.2 Digital television principles
- 2.18.1 Occupational Health and Safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities
- 2.18.9 Electronic Safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four circuit faults in two different types of digital television apparatus.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the

workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices & workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in digital television apparatus as described in 7) and including:
    - A Applying logical diagnostic methods.
    - B Using fault scenarios to test the source of circuit faults.
    - C Identifying the cause faults using logical diagnostic methods.
    - D Rectifying faults effectively.
    - E Verifying that the apparatus operates correctly.
    - F Documenting fault rectification.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in digital television apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the

industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4; 2.1 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.9

## **UEENEEH080A      Diagnose and rectify faults in digital transmission systems**

### **Unit Descriptor**

**1)**

This unit covers fault finding and repair of faults in digital transmission systems. The unit encompasses safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of digital transmission systems circuit components, rectifying faults, safety and functional testing and completing the necessary service documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH076A      Diagnose and repair faults in display circuits

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

1.1 OHS procedures for a given work area are obtained and understood.

1.2 Established OHS risk control measures and procedures are followed in preparation for the work.

1.3 Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with appropriate personnel.

1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.

1.5 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.

1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

2.1 OHS risk control measures and procedures for carrying out the work are followed.

2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Logical diagnostic methods are applied to diagnose digital television apparatus faults employing measurements of circuit operating parameters referenced to apparatus operating specifications.
  - 2.5 Suspected fault scenarios are tested as being the source of apparatus problems.
  - 2.6 Faults in the electronic components of the digital television apparatus are rectified to raise digital television apparatus to its operation standard.
  - 2.7 Circuits are tested to verify that the apparatus operates as intended and to specified requirements
  - 2.8 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and consistent with job specifications and requirements.
  - 2.9 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that apparatus faults have been rectified

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in digital transmission systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.34.3 Advanced digital television principles
- 2.10.29 Digital television transmission towers and equipment
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by diagnosing and rectifying at least four circuit faults in two different types of digital transmission systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to the extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Diagnose and rectify faults in digital transmission systems as described in 7) and including:
  - A Applying logical diagnostic methods..
  - B Using fault scenarios to test the source of circuit faults.
  - C Identifying the cause faults using logical diagnostic methods.
  - D Rectifying faults effectively.
  - E Verifying that the apparatus operates correctly.
  - F Documenting fault rectification.
  - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in digital transmission systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which

is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.8	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4; 2.1 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.9

## UEENEEH081A Design printed circuit boards

### Unit Descriptor

1)

This unit covers the design of printed circuit boards and component loading ready for manufacture. The unit encompasses application of knowledge of electronic circuits, components, component assemblies, developing alternative design schemes based on design brief, customer relations and documenting designs.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE025A Solve problems in complex multiples path circuits

OR

UEENEEH002A Carry out basic repairs to electronic apparatus by replacement of components

UEENEEH012A Solve problems in digital components of electronic apparatus

UEENEEH013A Solve problems in amplifier sections of electronic apparatus

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to design PCB assembly

- 1.1 OHS processes and procedures for a given work area are obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the proposed electronic circuits and sub assemblies is determined from the design brief or in consultations with appropriate person(s)
- 1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site

2 Develop PCB assembly design

- 2.1 Knowledge of electronic components and sub assemblies and standards are applied to the design.
- 2.2 Alternative arrangements for the design are considered based on the requirements outlined in the design brief.
- 2.3 Safety, functional and budget considerations are incorporated in the design.
- 2.4 PCB design draft is checked for compliance with the design brief and design rules.
- 2.5 PCB design is documented for submission to appropriate person(s) for approval
- 2.6 Solutions to unplanned situation are provided consistent with organisation policy.

3	Provide detailed assembly drawings and artwork files ready for production	3.1	PCB design is presented and explained to client representative and/or other relevant person(s).
		3.2	Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation policy.
		3.3	Final design is documented and approval obtained from appropriate person(s).
		3.4	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in digital transmission systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.1.2	Electronic component parameters and selection methods
2.9.91	Printed circuit board design techniques
2.18.1	Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing PCBs for different component population densities and related sub assemblies.

- Single sided PCB
- Doubled sided PCB
- Multi-layer PCB
- Analogue and digital circuits and components

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in digital transmission systems as described in 7) and including:
    - A Developing outlines of alternative designs.
    - B Developing the design within the safety and functional requirements and budget limitations.
    - C Documenting and presenting design effectively.
    - D Successfully negotiating design alteration requests.
    - E Obtaining approval for final design.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing and rectifying faults in digital transmission systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3

**Skills Enabling  
Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEH082A Develop solutions to RF amplifiers problems

### Unit Descriptor

1)

This unit covers developing engineering solutions to resolve problems with RF amplifiers. It encompasses working safely, applying extensive knowledge of RF amplifier circuits and device operation and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical RF amplifiers electronic problems are those encountered in meeting performance requirements and compliance standards, revising an RF amplifier electronic operating parameters and dealing with RF amplifiers electronic malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEH045A Develop solutions to analogue electronic problems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to develop engineering solution for RF amplifiers electronic problems.

- 1.1 OHS processes and procedures for a given work area are obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the RF amplifiers problem is determined from performance specifications and situation reports and in consultations with relevant persons.
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.

2 Develop engineering solution for RF amplifiers electronic problems.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of RF amplifiers circuit, device operation, characteristics and applications are applied to developing solutions to RF amplifiers problems.
- 2.3 Parameters, specifications and performance requirements in relation to each RF amplifiers problem are obtained in accordance with established procedures.

- |   |  |  |
|---|--|--|
|   | 2.4  | Approaches to resolving RF amplifiers problems are analysed to provide most effective solutions.   |
|   | 2.5  | Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.  |
|   | 2.6  | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards  |
| 3 | Test, document and implement engineering solution for RF amplifiers electronic problems. |  |
|   | 3.1  | Solutions to RF amplifiers problems are tested to determine their effectiveness and modified where necessary.  |
|   | 3.2  | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.   |
|   | 3.3  | Appropriately competent and qualified person(s) required to implement solutions to RF amplifiers problems are coordinated in accordance with regulatory requirements and enterprise policy. (See Note) |
|   | 3.4  | Justification for solutions used to solve RF amplifiers problems is documented for inclusion in work/project development records in accordance with professional standards.                            |

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing solutions to RF amplifiers problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.9.90 RF amplifiers

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four RF amplifiers electronic problems.

Note.

Typical RF amplifiers electronic problems are those encountered in meeting performance requirements and compliance standards, revising a RF amplifiers electronic operating parameters and dealing with RF amplifiers electronic malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its

‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop solutions to RF amplifiers problems as described in 7) and including:
    - A Understanding the extent of the RF-amplifiers electronic problem.
    - B Forming effective strategies for solution development and implementation.
    - C Obtaining RF-amplifiers electronic parameters, specifications and performance requirements appropriate to each problem.

- D Testing and solutions to RF-amplifiers electronic problems.
- E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
- F Documenting justification of solutions implemented in accordance with professional standards.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing solutions to RF amplifiers problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling 8.7)**

**Employment**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH083A Analyse the performance of wireless-based electronic systems

### Unit Descriptor

1)

This unit covers the analysis of wireless-based electronic systems to provide solutions to mobile communications performance. It encompasses working safely, applying extensive knowledge of mobile communications parameters, gathering and analysing data, applying problem solving techniques, developing and documenting results and solutions for use in design work.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEH046A Solve fundamental problems in electronic communications systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It is intended to apply to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

### Competency Field

4)

Electronics

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to analyse the performance of wireless-based systems	<p>1.1 OHS processes and procedures for a given work area are obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the wireless-based electronic systems issues are determined from performance specifications and situation reports and in consultations with relevant persons</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.</p> <p>1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.</p>
2 Analyse the wireless-based electronic systems performance	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of wireless communications principles are applied to analytical solutions to electronic systems.</p> <p>2.3 Parameters, specifications and performance requirements in relation to wireless-based electronic systems are obtained in accordance with established procedures.</p> <p>2.4 Approaches to analysing wireless-based electronic systems parameters are carried out to provide the most effective solution.</p> <p>2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.</p> <p>2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards</p>

- |   |   |     |  |
|---|---|-----|--|
| 3 | Document and report on the results of the wireless-based electronic systems performance analysis and actions taken. | 3.1 | Solutions to wireless-based electronic systems issues are evaluated to determine their effectiveness and modified where necessary.   |
|   |   | 3.2 | Analysis is documented including details of all findings, calculations and assumptions.  |
|   |   | 3.3 | Analysis is reported to appropriately personnel to establish appropriate action to be taken based on findings.   |
|   |   | 3.4 | Justification for findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with professional standards. |

### REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and analysing the performance of wireless-based electronic systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.4.3.2 | Networking fundamentals                       |
| 2.4.4   | Wireless networks infrastructure              |
| 2.4.38  | Fundamentals of wireless security             |
| 2.10.7  | Electronic communications, digital techniques |
| 2.18.1  | Occupational Health and Safety principles     |

### RANGE STATEMENT

- 7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to analysing wireless-based electronic systems parameters in at least two different electronic/computer-based systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Analyse the performance of wireless-based electronic systems as described in 7) and including:
    - A Understanding the wireless-based electronic systems performance issues.
    - B Forming effective strategies for analysing wireless-based electronic systems performance.
    - C Obtaining wireless-based electronic systems performance parameters, specifications and performance requirements appropriate to each situation.
    - D Evaluating the results of the analysis.
    - E Documenting analysis details of all findings, calculations and assumptions.

- F Documenting justification of actions to be implemented in accordance with professional standards.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in analysing the performance of wireless-based electronic systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEH084A Design DSP based systems

### Unit Descriptor

1)

This unit covers designing electronic DSP based systems incorporating DSPs and other digital and analogue elements. It encompasses working safely, following design brief, apply knowledge of digital and analogue devices, interpreting device specifications, constructing prototypes, testing developed system prototype operation and documenting design and development work.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A Solve problems in digital components of electronic apparatus

UEENEEH045A Develop solutions to analogue electronic problems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

## Electronics

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to design electronic DSP based systems	<p>1.1 OHS processes and procedures for a given work area are obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the proposed electronic DSP based system is determined from the design brief or in consultations with appropriate person(s)</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site</p> <p>1.5 Materials and devices/components required for the work are determined on compatibility of their specifications with DSP based system requirements and project budget constraints.</p>
2 Design electronic DSP based systems	<p>2.1 OHS risk control measures and procedures are followed.</p> <p>2.2 Knowledge of digital and analogue elements used in DSP based systems and compliance standards are applied to the design</p> <p>2.3 Alternative arrangements for the design are considered based on the requirements outlined in the design brief.</p> <p>2.4 Safety, functional and budget considerations are incorporated in the design.</p> <p>2.5 Prototype devices and circuits are constructed, programmed and tested for compliance with the design brief and regulatory requirements.</p> <p>2.6 Prototype malfunctions are rectified and retested to ensure effective operation of design.</p> <p>2.7 DSP based system design is documented for submission to appropriate person(s) for approval</p> <p>2.8 Solutions to unplanned situation are provided consistent with organisation policy.</p>

- |   |   |     |   |
|---|---|-----|---|
| 3 | Obtain approval for electronic DSP based systems design | 3.1 | DSP based system design is presented and explained to client representative and/or other relevant person(s).                    |
|   |   | 3.2 | Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation policy.    |
|   |   | 3.3 | Final design is documented and approval obtained from appropriate person(s).  |
|   |   | 3.4 | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards |

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing DSP based systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.8.10.4 Engineering Mathematics with Calculus
- 2.9.4.2 Digital Signal Processing
- 2.9.4.3 Digital Signal Processing Principles
- 2.18.1 Occupational Health and Safety principles

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to an electronic DSP based system incorporating digital and analogue elements.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design DSP based systems as described in 7) and including:
    - A Developing outlines of alternative designs.
    - B Developing the design within the safety and functional requirements and budget limitations.
    - C Documenting and presenting design effectively.
    - D Successfully negotiating design alteration requests.
    - E Obtaining approval for final design.
    - F Documenting justification of actions to be implemented in accordance with professional standards.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing DSP based systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.3; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 2.5; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	3

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 2.3; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.7; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## **UEENEEH085A    Design electronic data acquisition systems**

### **Unit Descriptor**

**1)**

This unit covers designing electronic data acquisition systems incorporating sensors and transducers and digital and analogue elements. It encompasses working safely, following design brief, apply knowledge of digital and analogue devices, interpreting device specifications, constructing prototypes, testing developed system prototype operation and documenting design and development work

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A    Solve problems in digital components of electronic apparatus

UEENEEH045A    Develop solutions to analogue electronic problems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It is intended to apply to any formal recognition for this standard at the aligned AQF 6 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Electronics

**ELEMENT**

**PERFORMANCE CRITERIA**

**5)** Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to design electronic data acquisition systems.

- 1.1 OHS processes and procedures for a given work area are obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the proposed electronic data acquisition system is determined from the design brief or in consultations with appropriate person(s)
- 1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site
- 1.5 Materials and devices/components required for the work are determined on compatibility of their specifications with data acquisition system requirements and project budget constraints.

2 Design electronic data acquisition systems

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 Knowledge of digital and analogue elements used in data acquisition systems and compliance standards are applied to the design
- 2.3 Alternative arrangements for the design are considered based on the requirements outlined in the design brief.
- 2.4 Safety, functional and budget considerations are incorporated in the design.
- 2.5 Prototype devices and circuits are constructed, programmed and tested for compliance with the design brief and regulatory requirements.
- 2.6 Prototype malfunctions are rectified and retested to ensure effective operation of design.
- 2.7 Data acquisition system design is documented for submission to appropriate person(s) for approval

- |   |     |   |
|---|-----|---|
|   | 2.8 | Solutions to unplanned situation are provided consistent with organisation policy.  |
| 3 Obtain approval for electronic data acquisition systems design. | 3.1 | Data acquisition system design is presented and explained to client representative and/or other relevant person(s).             |
|   | 3.2 | Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation policy.    |
|   | 3.3 | Final design is documented and approval obtained from appropriate person(s).  |
|   | 3.4 | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards |

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing DSP based systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.9.88 | Principles of Signal Conditioning         |
| 2.9.89 | Analogue Integrated Circuits              |
| 2.18.1 | Occupational Health and Safety principles |

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to an electronic data acquisition system incorporating digital and analogue elements and with at least three data acquisition interfaces.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design DSP based systems as described in 7) and including:
    - A Developing outlines of alternative designs.
    - B Developing the design within the safety and functional requirements and budget limitations.
    - C Documenting and presenting design effectively.
    - D Successfully negotiating design alteration requests.
    - E Obtaining approval for final design.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing DSP based systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.3; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 2.5; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	3

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 2.3; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.7; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8



**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1M  
M – Hazardous Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## **UEENEEM001A Report on the integrity of explosion-protected equipment in hazardous areas**

### **Unit Descriptor**

**1)**

This unit covers the explosion-protection aspects of plant and machinery operation and maintenance. It requires the ability to visually identify any damage or deterioration of explosion-protected equipment, monitor changes in the explosion hazard and to implement procedures established to limit the risk of an explosion.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit shall be assessed only after competencies in plant and general plant maintenance have been achieved. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit augments formally-acquired competencies and is intended to apply to any formal recognition for this standard at the aligned AQF 2 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to work in hazardous area.

1.1 Nature of the explosion hazard in the area is known and the status of the explosion hazard is ascertained through established procedures.

1.2 Operation and condition of plant and machinery, with regards to explosion-protection, is ascertained through established procedures.

1.3 Established procedures for use of the plant and machinery, with regards to explosion-protection techniques used in the area, are followed.

2 Observe condition of explosion-protection system area.

2.1 OHS policies and procedures, with regards to explosion-protection, are followed.

2.2 Performance of plant and machinery is monitored to identify faults that may affect the integrity of the explosion-protected equipment and wiring system.

2.3 Observations of explosion-protected equipment and wiring are made during normal operations and visual non-conformances that may affect the integrity of the explosion-protection technique are identified.

2.4 Explosion hazard monitoring equipment is observed and a potentially dangerous state of the hazard is identified, eg by using gas detectors.

3 Take actions to limit risk of an explosion.

3.1 Tools, equipment and testing devices needed to Non-conformances are reported and documented in accordance with established procedures.

3.2 Established procedures are followed in the event of a potential or immediate hazardous condition arising from any non-conformance identified in equipment/wiring or changes in the explosion hazard to a potentially dangerous state.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and reporting on the integrity of explosion protected equipment in hazardous areas. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.6 Hazardous area safe working practices
- 2.19.1 Hazardous areas and explosion-protection principles
- 2.19.2 Explosion protected equipment
- 2.19.23 Explosion-protection visual checks

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Report on the integrity of explosion-protected equipment in hazardous areas as described in 7) and including:
  - A Currency in the critical prerequisite requirements related to the safe working principles and practices
  - B Following work permits and clearance procedures.
  - C Monitoring hazards and following evacuation procedures.
  - D Correctly operation of plant and machinery.
  - E Following plant and electrical isolation procedures.
  - F Identifying visual damage or deterioration of explosion-protected equipment.
  - G Reporting visual defects.
  - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in reporting on the integrity of explosion protected equipment in hazardous areas.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the

essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
For optimisation of training and assessment effort, competency development in this unit may be arranged in combination with other competencies required by a given industry or enterprise for plant or machinery operation or in relation to installation, maintenance or service functions.

**Key competencies**

**8.6)**  
Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3	1
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**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM002A Attend to breakdowns in hazardous areas**

### **Unit Descriptor**

**1)**

This unit covers the explosion-protection aspects of attending to a breakdown in a hazardous area or of explosion-protected and associated equipment. It requires the ability to ascertain the nature of a breakdown, the extent of repairs required and the personnel needed to repair the breakdown.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEEM001A Report on the integrity of explosion protected equipment in hazardous areas

AND

Competencies in attending to breakdowns in general electrical or instrumentation equipment. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit augments formally-acquired competencies and is intended to apply to any formal recognition for this standard at the aligned AQF 3 level or higher. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to

Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field**

**4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to attend breakdown.

- 1.1 Nature of the breakdown is confirmed with appropriate personnel to establish the need to enter the hazardous area.
- 1.2 Maintenance records of equipment related to the reported breakdown are review for possible causes.
- 1.3 Safety to enter the hazardous area is established in accordance with established procedures and relevant clearance to do the work is obtained.
- 1.4 Testing devices and tools, anticipated as being needed for the work, are obtained and checked for correct operation and safety.

2 Evaluate extent of work.

- 2.1 OHS policies and procedures for working in a hazardous area are followed.
- 2.2 Extent of breakdown is evaluated and confirmed with appropriate personnel.
- 2.3 Other personnel required to determine cause and rectify breakdown is ascertained from available evidence and arrangements made for their attendance where applicable.
- 2.4 Extent of repair work is ascertained from available evidence and confirmed with appropriate personnel.
- 2.5 Limits of repair work that can be carried out in-situ are established with regards to explosion risk and in accordance with established procedures and requirements.

3 Arrange repair work.

- 3.1 Equipment is isolated in accordance with established procedures.
- 3.2 Circuits of equipment being withdrawn from service are terminated or isolated safely and in manner approved for the classification of the area.

- |   |                             |  |  |
|---|-----------------------------|--|--|
|   | 3.3                         | Certification documentation for replacement equipment is sighted to ensure that it is identical with the equipment it replaces and is in accordance with the explosion-protection system design. |  |
|   | 3.4                         | Repair work carried out in-situ is done in accordance with established procedures and requirements.  |  |
| 4 | Confirm completion of work. | 4.1  | Explosion-protected equipment and systems are inspected and tested after repairs are completed to ensure the integrity of the system.                          |
|   |                             | 4.2  | Appropriate personnel are notified of the completion of the repair work and details are documented in accordance with established procedures and requirements. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and attending to breakdowns in hazardous areas. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.18.6 | Hazardous area safe working practice                      |
| 2.19.1 | Hazardous areas and explosion-protection principles       |
| 2.19.2 | Explosion-protected equipment                             |
| 2.19.3 | Flameproof (Ex'd) explosion-protection technique          |
| 2.19.4 | Increased safety (Ex'e) explosion-protection technique    |
| 2.19.5 | Non-sparking (Ex'n) explosion-protection technique        |
| 2.19.6 | Intrinsic safety (Ex'i) explosion-protection technique    |
| 2.19.7 | Pressurization (Ex'p) explosion-protection technique      |
| 2.19.8 | Explosion-protection techniques for dusts                 |
| 2.19.9 | Common characteristics of explosion-protection techniques |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall/may be demonstrated in relation to any classified hazardous area and explosion-protection techniques and will be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex 'd']
- Increased safety [Ex 'e']
- Non-sparking [Ex 'n']
- Intrinsic safety [Ex 'i']
- Pressurization [Ex 'p']
- Dust-exclusion enclosures [Ex 'tD']
- Pressurization, dust [Ex 'pD']
- Encapsulation, dust [Ex 'mD']
- Intrinsic safety, dust [Ex 'iD']

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Attend to breakdowns in hazardous areas as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices
    - B Following work permits and clearance procedures
    - C Monitoring hazards and following evacuation procedures
    - D Following plant and electrical isolation procedures
    - E Correctly evaluating extent of breakdowns
    - F Interpreting certification documentation in relation to repair and replacement
    - G Following established breakdown procedures
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in attending to breakdowns in hazardous areas.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the

Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEM001A Report on the integrity of explosion protected equipment in hazardous areas

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.4	1
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**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM003A Use and maintain the integrity of portable gas detection devices**

### **Unit Descriptor 1)**

This unit covers the gas detection aspects of ensuring a work place is safe from explosive and toxic gases and vapours. It requires the ability to use measuring instruments accurately, follow written instructions and to write instructions for others.

### **Prerequisite Unit(s) 2)**

### **Competencies 2.1)**

Competency in this unit shall be assessed concurrently with or after other competencies required by a given industry or enterprise for plant or machinery operation, installation, maintenance or service functions. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills 2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit 3)**

This unit augments formally-acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to use portable gas detection device.	<p>1.1 The need to initiate gas detection is identified by OHS requirements and established procedures.</p> <p>1.2 The gas or vapour to be detected is established from plant/site records or consultation with relevant personnel.</p> <p>1.3 Gas detection device(s) for the gas/vapour to be detected is/are checked for calibration and response in accordance with manufacturer instructions.</p>
2 Establish safety of the area with regards to the presence of gases or vapours.	<p>2.1 OHS policies and procedures relating to gas/vapour detection are followed.</p> <p>2.2 Gas detection device is used in accordance with manufacturer instructions and with regards to environmental conditions.</p> <p>2.3 Observations of gas detection readings are recorded in accordance with established procedures.</p> <p>2.4 Safe-to-work is determined from gas detection reading and then clearance to work is issued in accordance with established procedures.</p>
3 Monitor gas detection devices for the presence of gases/vapours.	<p>3.1 The frequency of monitoring is determined from the nature of gas/vapour and the effect of environmental conditions (e.g. ambient temperature rise).</p> <p>3.2 Others are instructed in procedures to carry out monitoring and these instructions are documented.</p>
4 Follow procedures to maintain gas detection devices.	<p>4.1 Gas detection devices are stored in accordance with manufacturer recommendations.</p> <p>4.2 Gas detection devices are formally checked and calibrated periodically as recommended by the manufacturer.</p>

- 4.3 Storage, use and calibration record of the gas detection devices is maintained, in accordance with the established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and using and maintaining the integrity of portable gas detection devices. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.6 Hazardous area safe working practices
- 2.19.1 Hazardous areas and explosion-protection principles
- 2.19.24 Gas detection-portable devices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area or confined space.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Use and maintain the integrity of portable gas detection devices as described in 7) and including:
  - A Currency in the critical prerequisite requirements related to the safe working principles and practices
  - B Following work permits and clearance procedures.
  - C Monitoring hazards and following evacuation procedures.
  - D Determining whether the gas/vapour level in a work area is safe.
  - E Following procedures to maintain the integrity of gas detection devices
  - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in using and maintaining the integrity of portable gas detection devices.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

For optimisation of training and assessment effort competency development in this unit may be arranged in combination with other competencies required by a given industry or enterprise for plant or machinery operation, installation, maintenance or service functions.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM004A Install explosion-protected equipment and wiring systems**

### **Unit Descriptor**

**1)**

This unit covers the explosion-protection aspects for installing explosion-protected and associated equipment and wiring systems. It requires the ability to match equipment with that specified for a given location, work safely, and to installation standards and complete the necessary installation documentation

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

UEENEEM001A Report on the integrity of explosion protected equipment in hazardous areas

AND

Competencies in installation of general low voltage or extra low voltage electrical/electronic equipment and wiring systems. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit augments formally-acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1	Prepare for installation of equipment and wiring.	1.1	OHS policies and procedures for preparing to work in a hazardous area are followed.
		1.2	Types of explosion-protected equipment and wiring systems to be installed are verified from design documents.
		1.3	Location in which specific items of equipment and circuits are to be installed is determined from design documents.
		1.4	Explosion-protected equipment markings are checked to ensure they conform to design specifications and certification documents.
		1.5	Certification document supplied with each item of equipment is collected for forwarding to appropriate personnel.
		1.6	Special tools, equipment and testing devices needed to carry out the installation work are obtained and checked for correct operation and safety.
2	Install the equipment and wiring systems	2.1	OHS policies and procedure for working in a hazardous area are followed.
		2.2	Equipment is installed to conform with design specifications and standards and within the limits specified by the equipment certification.
		2.3	Equipment and wiring system components are dismantled where necessary and parts stored to protect them against loss or damage.
		2.4	Equipment and wiring are installed in a manner that does not reduce the type of protection afforded by the equipment design.
		2.5	Circuits are tested prior to connection to devices to ensure resistance of earthing is sufficiently low, installation resistance is safe and polarity and connections are correct and each circuit complies with requirements.

- |   |   |     |   |
|---|---|-----|---|
| 3 | Confirm that the installation is completed. | 3.1 | Arrangements are made, in accordance with requirements, for an initial inspection to be carried out on the installation.                                |
|   |   | 3.2 | Appropriate action is taken to rectify non-conformances found during the initial inspection to ensure the installation complies with requirements.      |
|   |   | 3.3 | The completed installation is documented in accordance with requirements and forwarded to personnel responsible for compiling the verification dossier. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing explosion protected equipment and wiring systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.6 Hazardous area safe working practices
- 2.19.1 Hazardous areas and explosion-protection principles
- 2.19.2 Explosion-protected equipment
- 2.19.3 Flameproof (Ex‘d’) explosion-protection technique
- 2.19.4 Increased safety (Ex‘e’) explosion-protection technique
- 2.19.5 Non-sparking (Ex‘n’) explosion-protection technique
- 2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique
- 2.19.7 Pressurization (Ex‘p’) explosion-protection technique
- 2.19.8 Explosion-protection techniques for dusts
- 2.19.9 Common characteristics of explosion-protection techniques
- 2.19.10 Hazardous areas installation and maintenance requirements
- 2.19.11 Hazardous areas cable termination techniques

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This competency must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and will be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

k	• Flameproof	[Ex 'd']
	• Increased safety	[Ex 'e']
	• Non-sparking	[Ex 'n']
	• Intrinsic safety	[Ex 'i']
	• Pressurization	[Ex 'p']
	• Dust-exclusion enclosures	[Ex 'tD']
	• Pressurization, dust	[Ex 'pD']
	• Encapsulation, dust	[Ex 'mD']
	• Intrinsic safety, dust	[Ex 'iD']

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install explosion protected equipment and wiring systems as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices
    - B Working safely in a potentially hazardous area including, the use of work permits and clearances, hazard monitoring and evacuation procedures, and plant and electrical isolation.
    - C Handling and installing equipment and wiring in a manner that does not reduce the type of protection afforded by the equipment design.
    - D Checking equipment against certification documents and design specifications.
    - E Documenting installation completion.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing explosion protected equipment and wiring systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEM001A Report on the integrity of explosion protected equipment in hazardous area

AND/OR

UEENEEM006A Maintain equipment in hazardous areas

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.3	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.3
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.2

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM005A Install and maintain integrity of fixed gas detection equipment**

### **Unit Descriptor**

1)

This unit covers the installation, calibration and response checking of permanent gas detection equipment. It requires the ability to match equipment with that specified for a given location and to use manufacturer manuals to maintain accuracy of gas monitoring devices.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEEM004A Install explosion-protected equipment and wiring systems

OR

UEENEEM006A Maintain equipment in hazardous areas

This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions

subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1	Prepare for installation gas detection equipment.	1.1	OHS policies and procedures for preparing to work in a hazardous area are followed.
		1.2	Location in which gas detection of equipment is to be installed is determined from design documents.
		1.3	Detection equipment markings are checked to ensure they conform to design specifications and certification documents.
		1.4	Certification document supplied with each item of gas detection equipment is collected for inclusion in site records.
2	Install gas detection equipment.	2.1	OHS policies and procedures are followed.
		2.2	Gas detection equipment is installed in appropriate locations and in conformance with design specifications and standards and within the limits specified by the equipment certification and manufacturer.
		2.3	Gas detection is installed in a manner that does not reduce the type of protection afforded by any associated explosion-equipment design.
3	Response checking and calibration of gas detection equipment.	3.1	OHS policies and procedures are followed.
		3.2	Gas detection equipment is formally checked and calibrated periodically as specified by the manufacturer.
		3.3	Installation and maintenance of gas detection equipment is documented in accordance with requirements and forwarded to personnel responsible for compiling site dossier.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintaining integrity of fixed gas detection equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.18.6	Hazardous areas safe working practices
2.19.1	Hazardous areas and explosion-protection principles
2.19.2	Explosion-protected equipment
2.19.3	Flameproof (Ex'd') explosion-protection technique
2.19.4	Increased safety (Ex'e') explosion-protection technique
2.19.5	Non-sparking (Ex'n') explosion-protection technique
2.19.6	Intrinsic safety (Ex'i') explosion-protection technique
2.19.7	Pressurization (Ex'p') explosion-protection technique
2.19.8	Explosion-protection techniques for dusts
2.19.9	Common characteristics of explosion-protection techniques
2.19.10	Hazardous areas installation and maintenance requirements
2.19.11	Hazardous areas cable termination techniques
2.19.25	Gas detection-fixed equipment

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### **Overview of Assessment**

#### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### **Critical aspects of evidence required to**

#### **8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and maintain integrity of fixed gas detection equipment as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices
    - B Working safely in a potentially hazardous area or confined space including the use of work permits and clearances, hazard monitoring and evacuation procedures and plant and electrical isolation
    - C Handling and installing equipment and wiring in a manner that does not reduce the integrity afforded by the equipment design
    - D Checking equipment against certification documents and design specifications
    - E Documenting installation and maintenance activities
    - F Following procedures to maintain the integrity of gas detection
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and maintaining integrity of fixed gas detection equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEM004A      Install explosion protected equipment and wiring systems

AND/OR

UEENEEM006A      Maintain equipment in hazardous areas

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEM006A Maintain equipment in hazardous areas

### Unit Descriptor

1)

This unit covers the explosion-protection aspects for maintaining explosion-protected and associated equipment and wiring systems. It requires the ability to follow a maintenance program, work safely, carry out maintenance to standards and manufacturer instructions and complete the necessary maintenance documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed and competencies in the maintenance of general low-voltage or extra-low-voltage electrical/electronic equipment and wiring systems have been achieved.

UEENEEM001A Report on the integrity of explosion protected equipment in hazardous areas

AND

Competencies in maintaining general low voltage or extra-low voltage electrical/electronic equipment. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit augments formally-acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to carry out maintenance.

- 1.1 OHS policies and procedures for preparing to work in a hazardous area are followed.
- 1.2 Area classification and details of explosion-protected equipment and wiring are ascertained from hazardous area layout drawings and equipment certification documents held in hazardous area records.
- 1.3 Extent of maintenance to be conducted is established from the maintenance schedule and reports held in hazardous area records.
- 1.4 Special tools, equipment and testing devices needed to carry out the maintenance work are obtained and checked for correct operation and safety.

2 Carry out maintenance.

- 2.1 OHS policies and procedures for working in a hazardous area are followed.
- 2.2 Work is carried out to plan schedule to ensure all items are correctly maintained.
- 2.3 Equipment is checked and tested in accordance with established procedures to determine whether it functions correctly, complies with approval documentation and is not subject to deterioration or damage.

- |   |  |  |
|---|--|--|
|   | 2.4  | Equipment is adjusted or repaired within the limits permitted by the equipment certification and in accordance with manufacturer instructions.   |
|   | 2.5  | Certification documentation for replacement equipment is sighted to ensure that it is identical to the equipment it replaces and is in accordance with the explosion-protection system design. |
|   | 2.6  | Circuits of equipment being withdrawn from service are terminated or isolated safely and in the manner approved for the classification of the area.  |
|   | 2.7  | Flexible cables and cords are examined and removed from service if they are not in immediate use or are found to be defective or damaged.  |
|   | 2.8  | Spare equipment, flexible cables and cords are maintained and suitably stored where they are not likely to suffer deterioration or damage.   |
| 3 | Complete maintenance work inspections and documentation. | 3.1 Detailed inspection of explosion-protected equipment and systems subject to the maintenance work is arranged in accordance with established procedures and requirements.                   |
|   |  | 3.2 Results of inspections and maintenance activities are recorded in accordance with established procedures and requirements.   |
|   |  | 3.3 Appropriate personnel are notified of the completion of maintenance and details are documented in accordance with established procedures and requirements.                                 |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintaining integrity of fixed gas detection equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.18.6 | Hazardous area safe working practices               |
| 2.19.1 | Hazardous areas and explosion-protection principles |
| 2.19.2 | Explosion-protected equipment                       |
| 2.19.3 | Flameproof (Ex 'd') explosion-protection technique  |

2.19.4	Increased safety (Ex‘e’) explosion-protection technique
2.19.5	Non-sparking (Ex‘n’) explosion-protection technique
2.19.6	Intrinsic safety (Ex‘i’) explosion-protection technique
2.19.7	Pressurization (Ex‘p’) explosion-protection technique
2.19.8	Explosion-protection techniques for dusts
2.19.9	Common characteristics of explosion-protection techniques
2.19.10	Hazardous areas installation and maintenance requirements
2.19.11	Hazardous areas cable termination techniques

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and must be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex ‘d’]
- Increased safety [Ex ‘e’]
- Non-sparking [Ex ‘n’]
- Intrinsic safety [Ex ‘i’]
- Pressurization [Ex ‘p’]
- Dust-exclusion enclosures [Ex ‘tD’]
- Pressurization, dust [Ex ‘pD’]
- Encapsulation, dust [Ex ‘mD’]
- Intrinsic safety, dust [Ex ‘iD’]

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and maintain integrity of fixed gas detection equipment as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices
    - B Working safely in a potentially hazardous area or confined space including the use of work permits and clearances, hazard monitoring and evacuation procedures and plant and electrical isolation
    - C Identifying defects and faults.
    - D Interpreting certification documentation in relation to maintenance, repair and replacement
    - E Following established maintenance procedures.
    - F Documenting maintenance details.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and maintaining integrity of fixed gas detection equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEM001A Report on the integrity of explosion protected equipment in hazardous area

AND/OR

UEENEEM004A Install explosion protected equipment and wiring systems

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM007A Overhaul and repair explosion-protected equipment**

### **Unit Descriptor**

**1)**

This unit covers the explosion-protection aspects of overhauling and repairing explosion-protected equipment. It requires the ability to establish and document the level of work required, arranging for the overhaul/repair to be carried, verify compliance of overhauled/repared equipment and complete the necessary documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competence in this unit shall be assessed only after competencies in the overhaul and repair of general low-voltage or extra-low-voltage electrical/electronic equipment have been achieved. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit augments formally-acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1	Prepare for overhaul/repair of equipment.	1.1	Instructions on overhaul and/or repair are received and expected outcomes of the work confirmed with appropriate personnel.
		1.2	Certification documents for the equipment are sought and received in order to check that the equipment complies with the certification.
2	Establish the level of overhaul required.	2.1	Measurements, tests and inspections are carried out on the equipment in accordance with OHS and other established procedures.
		2.2	The extent of work to be done is determined from measurement, test and inspection results and their correspondence with original certification and the requirements of Standards.
		2.3	Specifications and instructions for the overhaul/repair work are documented in accordance with requirements.
3	Arrange overhaul/repair work.	3.1	Arrangements are made for the overhaul/repair work to be done in accordance with established procedures.
		3.2	A copy of overhaul/repair specifications and instructions is provided to personnel responsible for carrying out the work.

4	Verify that equipment complies with original certification.	4.1	Level of testing required to verify that overhauled/repared equipment complies with original certification specifications is determined in accordance with requirements.
		4.2	Verification tests are conducted in accordance with established procedures.
5	Document overhaul/repair work.	5.1	Equipment marking is checked and marked where applicable, in accordance with original certification.
		5.2	Overhaul/repair work is documented in accordance with requirements stating that the equipment complies with the original certification.
		5.3	Documentation of the repair work is filed in hazardous area records and a copy is issued with the equipment.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and overhauling and repairing explosion protected equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.19.1 Hazardous areas and explosion-protection principles
- 2.19.2 Explosion-protected equipment
- 2.19.3 Flameproof (Ex‘d’) explosion-protection technique
- 2.19.4 Increased safety (Ex‘e’) explosion-protection technique
- 2.19.5 Non-sparking (Ex‘n’) explosion-protection technique
- 2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique
- 2.19.7 Pressurization (Ex‘p’) explosion-protection technique
- 2.19.8 Explosion-protection techniques for dusts
- 2.19.9 Common characteristics of explosion-protection techniques
- 2.19.13.1 Explosion protected equipment overhaul and

repair, general requirements

### 2.19.13.2 Overhaul and repair requirements specific to each explosion-protection technique

#### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and must be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex 'd']
- Increased safety [Ex 'e']
- Non-sparking [Ex 'n']
- Intrinsic safety [Ex 'i']
- Pressurization [Ex 'p']
- Dust-exclusion enclosures [Ex 'tD']
- Pressurization, dust [Ex 'pD']
- Encapsulation, dust [Ex 'mD']
- Intrinsic safety, dust [Ex 'iD']

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Volume 2, Part 2.1.

#### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range

Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Overhaul and repair explosion-protected equipment as described in 7) and including:
      - A Currency in the critical prerequisite requirements related to the safe working principles and practices
      - B Following OHS procedures.
      - C Interpreting certification documentation and Standards.
      - D Measuring, testing and inspecting equipment for compliance with certification and Standards.
      - E Specifying overhaul/repair work.
      - F Documenting overhaul/repair work.
      - G Using quality systems.
      - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in overhauling and repairing explosion protected equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort competency development in this unit may be arranged concurrently with competence in the overhaul and repair of general low-voltage or extra-low-voltage.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	1
How is team work used within this	Refer to the following Performance Criteria for examples of application:	

competency?	3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the	Refer to the following Performance Criteria for examples of application:

**UEENEEM007A – Overhaul and repair explosion-protected equipment**

	meaningful work task	1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM008A Assess explosion-protected equipment for compliance with Standards**

### **Unit Descriptor**

**1)**

This unit covers the explosion-protection aspects of assessing compliance of electrical equipment. It requires the ability to assess and to report on the integrity of equipment, gather assessment and test documentation from accredited testing stations and prepares submissions to accredited certification bodies.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competence in this unit shall be assessed only after competencies in the compliance assessment of general low-voltage or extra-low-voltage electrical/electronic equipment has been achieved. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

**Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships and the like

**Competency Field**

**4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare for examination of certified equipment.

1.1 Documentation in accordance with established procedures is obtained and read to determine the certification specifications for which the equipment is to be assessed.

1.2 Tools and measuring devices needed for examination are obtained and checked for correct, accurate and safe operation.

1.3 Examination area is checked to ensure it is safe to conduct examinations in accordance with established procedures.

2 Conduct equipment examination.

2.1 Examination is set up in accordance with established procedures.

2.2 Examination is carried out in accordance with OHS and other established procedures.

2.3 Any tests required to establish conformity are determined.

3 Document and submit examination and test results.

3.1 Assessment results reporting on the integrity of explosion-protected electrical equipment are documented in accordance with requirements and established procedures.

- 3.2 Assessment and test documentation, and where appropriate, issued documentation from accredited testing stations, are recorded in accordance with requirements and established procedures.
- 3.3 Assessment and test documentation is forwarded to appropriate personnel, or accredited certification bodies, responsible for issuing certificates of conformity in accordance with requirements and established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and assessing explosion protected equipment for compliance with Standards. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.19.1 Hazardous areas and explosion-protection principles
- 2.19.2 Explosion-protected equipment
- 2.19.3 Flameproof (Ex 'd') explosion-protection technique
- 2.19.4 Increased safety (Ex 'e') explosion-protection technique
- 2.19.5 Non-sparking (Ex 'n') explosion-protection technique
- 2.19.6 Intrinsic safety (Ex 'i') explosion-protection technique
- 2.19.7 Pressurization (Ex 'p') explosion-protection technique
- 2.19.8 Explosion-protection techniques for dusts
- 2.19.9 Common characteristics of explosion-protection techniques
- 2.19.21 Explosion-protected equipment conformity assessment

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and must be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex 'd']
- Increased safety [Ex 'e']
- Non-sparking [Ex 'n']
- Intrinsic safety [Ex 'i']
- Pressurization [Ex 'p']
- Dust-exclusion enclosures [Ex 'tD']
- Pressurization, dust [Ex 'pD']
- Encapsulation, dust [Ex 'mD']
- Intrinsic safety, dust [Ex 'iD']

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the

workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assess explosion protected equipment for compliance with Standards as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices
    - B Following OHS procedures
    - C Interpreting certification documentation and Standards
    - D Examining equipment for compliance with specifications.
    - E Determining conformity tests required, in association with certification and testing stations
    - F Interpreting results
    - G Reporting examination and test outcomes to an accredited certification body
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assessing explosion protected equipment for compliance with Standards.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort competency development in this unit may be arranged concurrently with competence in the overhaul and repair of general low-voltage or extra-low-voltage.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3	1
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**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEM009A Test installations in hazardous areas

### Unit Descriptor

1)

This unit covers the explosion-protection aspects for electrical installations for hazardous areas. It requires the ability to select, prepare and use appropriate testing devices, work safely and to Standards and to interpret and record test results.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEEM004A Install explosion-protected equipment and wiring systems

OR

UEENEEM006A Maintain equipment in hazardous areas

This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit augments formally-acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable

contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to conduct testing.

- 1.1 OHS policies and procedures for preparing to work in an area where a potentially explosive atmosphere may be present are followed.
- 1.2 Area classification is ascertained from the hazardous area layout drawings or other classification documents.
- 1.3 Location of each item of equipment and of circuits subject to testing is determined from design drawings and documentation.
- 1.4 Special tools, equipment and testing devices needed for the testing work are obtained and checked for correct operation and safety.

2 Conduct testing.

- 2.1 OHS policies and procedures for working in a hazardous area are followed.
- 2.2 Parts of equipment that are dismantled in order to conduct testing are stored to protect them against loss or damage.
- 2.3 Certified and approved low energy testing devices are selected and used to test into areas where explosive hazard may be present.
- 2.4 Sensitive circuit components that require to be tested which are likely to be damaged by high-test voltages are tested by an appropriate testing method.
- 2.5 Tests necessary to determine whether the electrical system complies with requirements for the explosion-protection techniques to be used and for electrical safety are conducted in accordance with established procedures.
- 2.6 When testing has been completed, equipment parts and circuit connections are replaced in a manner that ensures the integrity of the explosion-protection system.

- |   |                                    |     |   |
|---|------------------------------------|-----|---|
| 3 | Confirm and document test results. | 3.1 | Non-conformances and faults revealed by the testing and the resulting recommended actions are documented and reported to appropriate personnel.   |
|   |                                    | 3.2 | Completion of testing is verified and a copy of the testing documentation submitted to the appropriate personnel for inclusion in the hazardous area records in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and testing installations in hazardous areas. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.18.6  | Hazardous areas safe working practices                    |
| 2.19.1  | Hazardous areas and explosion-protection principles       |
| 2.19.2  | Explosion-protected equipment                             |
| 2.19.3  | Flameproof (Ex‘d’) explosion-protection technique         |
| 2.19.4  | Increased safety (Ex‘e’) explosion-protection technique   |
| 2.19.5  | Non-sparking (Ex‘n’) explosion-protection technique       |
| 2.19.6  | Intrinsic safety (Ex‘i’) explosion-protection technique   |
| 2.19.7  | Pressurization (Ex‘p’) explosion-protection technique     |
| 2.19.8  | Explosion-protection techniques for dusts                 |
| 2.19.9  | Common characteristics of explosion-protection techniques |
| 2.19.10 | Hazardous areas installation and maintenance requirements |
| 2.19.11 | Hazardous areas cable termination techniques              |
| 2.19.22 | Hazardous areas installation testing                      |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and must be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex 'd']
- Increased safety [Ex 'e']
- Non-sparking [Ex 'n']
- Intrinsic safety [Ex 'i']
- Pressurization [Ex 'p']
- Dust-exclusion enclosures [Ex 'tD']
- Pressurization, dust [Ex 'pD']
- Encapsulation, dust [Ex 'mD']
- Intrinsic safety, dust [Ex 'iD']

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Test installations in hazardous areas as described in 7) and including:
  - A Currency in the critical prerequisite requirements related to the safe working principles and practices
  - B Working safely in a potentially hazardous area in relation to work permits and clearances, hazard monitoring and evacuation procedures, plant and electrical isolation
  - C Handling and installing equipment and wiring in a manner that does not reduce the type of protection afforded by the equipment design
  - D Conducting tests
  - E Documenting testing outcomes
  - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in testing installations in hazardous areas.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEM002A Attend to breakdowns in hazardous areas

OR

UEENEEM004A Install explosion protected equipment and wiring systems

OR

UEENEEM006A Maintain equipment in hazardous areas

**Key competencies**

**8.6)**  
Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM010A    Conduct close inspection of existing hazardous areas installations**

### **Unit Descriptor**

**1)**

This unit covers the explosion-protection aspects for conducting visual and close inspections of electrical installations for hazardous areas. It requires the ability to follow inspection programs, work safely, and identify conditions that affect the integrity of explosion-protection and document inspection findings.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEEM002A    Attend to breakdowns in hazardous areas  
OR

UEENEEM004A    Install explosion-protected equipment and wiring systems  
OR

UEENEEM006A    Maintain equipment in hazardous areas  
OR

UEENEEM016A    Design electrical installations in hazardous areas

This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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**Application of the Unit 3)**

This unit applies to any formal recognition for this standard at the aligned AQF 4 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1	Prepare for inspection.	1.1	Type of inspection is ascertained from the inspection schedule retained in the hazardous area records.
		1.2	Areas classification is ascertained from hazardous area layout drawings retained in the hazardous area records.
2	Conduct inspection.	2.1	Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
		2.2	OHS policies and procedures are followed.
		2.3	Equipment and installation is checked for damage or deterioration in accordance with the inspection schedule.
3	Report inspection results.	3.1	Non-conformances and result of the inspection documented and reported to appropriate personnel in accordance with established procedures.

- 3.2 Completion of inspection is verified and a copy of the inspection documentation submitted to the appropriate personnel for inclusion in the hazardous area records in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and testing installations in hazardous areas. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.6 Hazardous areas safe working practices
- 2.19.1 Hazardous areas and explosion-protection principles
- 2.19.2 Explosion-protected equipment
- 2.19.3 Flameproof (Ex'd') explosion-protection technique
- 2.19.4 Increased safety (Ex'e') explosion-protection technique
- 2.19.5 Non-sparking (Ex'n') explosion-protection technique
- 2.19.6 Intrinsic safety (Ex'i') explosion-protection technique
- 2.19.7 Pressurization (Ex'p') explosion-protection technique
- 2.19.8 Explosion-protection techniques for dusts
- 2.19.9 Common characteristics of explosion-protection techniques
- 2.19.10 Hazardous areas installation and maintenance requirements
- 2.19.18 Hazardous areas close inspection requirements

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and must be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex 'd']
- Increased safety [Ex 'e']
- Non-sparking [Ex 'n']
- Intrinsic safety [Ex 'i']
- Pressurization [Ex 'p']
- Dust-exclusion enclosures [Ex 'tD']
- Pressurization, dust [Ex 'pD']
- Encapsulation, dust [Ex 'mD']
- Intrinsic safety, dust [Ex 'iD']

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in

some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Test installations in hazardous areas as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices
    - B Working safely in a potentially hazardous area in relation to work permits and clearances, hazard monitoring and evacuation procedures, plant and electrical isolation
    - C Inspecting equipment and wiring in a manner that does not reduce the type of protection afforded by the equipment design
    - D Conducting close inspections
    - E Documenting inspection outcomes
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in testing installations in hazardous areas.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEM002A Attend to breakdowns in hazardous areas

OR

UEENEEM004A Install explosion protected equipment and wiring systems

OR

UEENEEM006A Maintain equipment in hazardous areas

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM011A    Conduct detailed inspection of hazardous areas installations**

### **Unit Descriptor**

**1)**

This unit covers the explosion-protection aspects of conducting initial, periodic and sample audit inspections of explosion-protected equipment and installations. It requires the ability to audit a site dossier, work safely in a hazardous area, inspect against Standards and report and act on inspection results.

Note:

1. This unit is endorsed for each of the explosion-protection techniques in which competency is demonstrated. Designation for each endorsement is given in Clause '5 Range statement' in this unit.
2. This unit is equivalent to 'UTENES410B Conduct detailed inspection of hazardous areas installations'

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEEM010A    Conduct close inspection of existing hazardous areas installations

This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      4      Writing      4      Numeracy      4

### **Application of the Unit**

**3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1	Audit records system	1.1	Records system is reviewed to verify that essential hazardous area documentation is retained and procedures for maintaining records are established
		1.2	Hazardous area classification and design drawings and documentation are checked to verify that appropriate procedures have been followed in assuring the area is safe
2	Prepare for inspection	2.1	Type and intended location of each item of equipment and circuits subject to inspection are determined from design drawings and documentation
		2.2	OHS policies and procedures for preparing to work in a hazardous area are followed
		2.3	Special tools, equipment and devices needed for the inspection are obtained and checked for correct operation and safety
3	Conduct inspection	3.1	OHS policies and procedure for working in a hazardous area are followed

- 3.2 Parts of equipment that are dismantled in order to conduct inspection are stored to protect them against loss or damage
- 3.3 Equipment, systems and installation are inspected for compliance with the design specifications retained in hazardous area records and in accordance with requirements
- 3.4 Where applicable, after the inspection of each item, equipment parts and circuit connections are replaced in a manner that ensures the integrity of the explosion-protection system
- 4 Report inspection results
  - 4.1 Any non-conformances, faults or unauthorised modifications are documented in accordance with established procedures
  - 4.2 Where applicable, a non-conformance report, including the actions taken and a statement on whether circuits have been re-energised, is made and forwarded to the appropriate personnel
  - 4.3 Documentation in relation to all aspects of the inspection are forwarded to the appropriate personnel for inclusion in hazardous area records in accordance with requirements

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conducting detailed inspection of hazardous areas installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.6 Hazardous areas safe working practices
- 2.19.1 Hazardous areas and explosion-protection principles
- 2.19.2 Explosion-protected equipment
- 2.19.3 Flameproof (Ex'd') explosion-protection technique
- 2.19.4 Increased safety (Ex'e') explosion-protection technique

2.19.5	Non-sparking (Ex'n') explosion-protection technique
2.19.6	Intrinsic safety (Ex'i') explosion-protection technique
2.19.7	Pressurization (Ex'p') explosion-protection technique
2.19.8	Explosion-protection techniques for dusts
2.19.9	Common characteristics of explosion-protection techniques
2.19.10	Hazardous areas installation and maintenance requirements
2.19.12	Hazardous areas detailed inspection techniques
2.19.18	Hazardous areas close inspection requirements

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and must be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex 'd']
- Increased safety [Ex 'e']
- Non-sparking [Ex 'n']
- Intrinsic safety [Ex 'i']
- Pressurization [Ex 'p']
- Dust-exclusion enclosures [Ex 'tD']
- Pressurization, dust [Ex 'pD']
- Encapsulation, dust [Ex 'mD']
- Intrinsic safety, dust [Ex 'iD']

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct detailed inspection of hazardous areas installations as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices
    - B Handling and installing equipment and wiring in a manner that does not reduce the type of protection afforded by the equipment design
    - C Identifying non-compliant apparatus
    - D Identifying non-compliant installation methods
    - E Documenting inspection outcomes
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Note:**

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting detailed inspection of hazardous areas installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEM010A      Conduct close inspection of existing hazardous areas installations

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.3	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.3

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM012A    Develop and manage maintenance programs for hazardous areas electrical equipment**

### **Unit Descriptor**

1)

This unit covers the explosion-protection aspects of plant maintenance schemes. It requires the ability to develop and manage maintenance programs incorporating strategies for periodic inspections, repair/overhaul/replacement of components and recording of maintenance outcomes.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEEM006A    Maintain equipment in hazardous areas

OR

Competencies in developing and managing general electrical/instrumentation maintenance programs. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions

subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1 Establish maintenance requirements.

- 1.1 Policies and procedures are developed to include OHS practices, skills required and frequency and level of maintenance work.
- 1.2 Systems are established to manage and record maintenance work and up-to-date hazardous area records in accordance with requirements.
- 1.3 Level of repair to be done under maintenance work is established in accordance with requirements.
- 1.4 Arrangements are made to check that the hazardous area, explosion-protected equipment and installation comply with hazardous area records.
- 1.5 Discrepancies between the hazardous area, explosion-protected equipment and installation and the hazardous area records are documented and arrangements made to ensure the area is appropriately classified and explosion-protection systems are adequate.

2 Develop and implement maintenance schedule.

- 2.1 Maintenance schedules are developed from recommendations of Standards and equipment manufacturers and in accordance with requirements.
- 2.2 Procedures are developed and implemented to ensure the maintenance program is followed in accordance with the planned schedule and requirements.
- 2.3 Procedures are developed and implemented to ensure the hazardous area records are maintained in accordance with planned schedule and requirements.

3 Evaluate maintenance program.

- 3.1 Periodic and sample inspection reports are used to ascertain maintenance quality and the need for revision of maintenance schedule and frequency.

- 3.2 Maintenance schedule is periodically reviewed and revised to maintain the integrity of the explosion-protection system.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing and managing maintenance programs for hazardous areas electrical equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.19.1 Hazardous areas and explosion-protection principles
- 2.19.2 Explosion-protected equipment
- 2.19.3 Flameproof (Ex'd') explosion-protection technique
- 2.19.4 Increased safety (Ex'e') explosion-protection technique
- 2.19.5 Non-sparking (Ex'n') explosion-protection technique
- 2.19.6 Intrinsic safety (Ex'i') explosion-protection technique
- 2.19.7 Pressurization (Ex'p') explosion-protection technique
- 2.19.8 Explosion-protection techniques for dusts
- 2.19.9 Common characteristics of explosion-protection techniques
- 2.19.10 Hazardous areas installation and maintenance requirements
- 2.19.19 Hazardous areas management

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and must be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex ‘d’]
- Increased safety [Ex ‘e’]
- Non-sparking [Ex ‘n’]
- Intrinsic safety [Ex ‘i’]
- Pressurization [Ex ‘p’]
- Dust-exclusion enclosures [Ex ‘tD’]
- Pressurization, dust [Ex ‘pD’]
- Encapsulation, dust [Ex ‘mD’]
- Intrinsic safety, dust [Ex ‘iD’]

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical

equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop and manage maintenance programs for hazardous areas electrical equipment as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices
    - B Establishing maintenance policies and procedures that

encompass OHS responsibilities

- C Establishing management maintenance systems that address the special requirements for explosion-protected equipment and installations
- D Ensuring a hazardous area is appropriately classified and explosion-protection strategies are adequate
- E Developing and implementing maintenance plans and schedules in relation to explosion-protected equipment and installations
- F Evaluating maintenance programs in relation to explosion-protected equipment and installations
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing and managing maintenance programs for hazardous areas electrical equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEM006A      Maintain equipment in hazardous areas

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM013A Ensure the safety of hazardous areas**

### **Unit Descriptor**

1)

This unit covers the explosion-protection aspects of ensuring that potentially explosive atmospheres, generated by production, processing or servicing activities, do not pose a hazard to persons, property or the environment.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competence in this unit shall be assessed only after competencies in general plant management have been achieved. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

4)

Hazards

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
1 Establish possibility of explosive hazard.	<p>1.1 Competent person(s) are engaged to provide advice on the nature and extent of any explosive hazard on the site.</p> <p>1.2 Measures are taken to ensure explosive hazards are identified and the area classified by competent person(s) in accordance with requirements.</p> <p>1.3 Arrangements are made to establish a hazardous area records system in accordance with requirements.</p>
2 Establish explosion-protection strategies for site.	<p>2.1 Competent person(s) are engaged to design the explosion-protection system and installation.</p> <p>2.2 Where applicable explosion-protection system and installation design is verified with Statutory Authority for compliance with requirements.</p>
3 Implement explosion-protection strategies.	<p>3.1 Competent person(s) are engaged to install explosion-protected equipment and wiring system.</p> <p>3.2 Procedures are implemented to ensure the explosion-protected equipment and wiring system installation is tested and inspected in accordance with requirements.</p>
4 Establish and implement procedures for maintaining explosion-protection.	<p>4.1 Competent person(s) are engaged to develop inspection/maintenance schedules, including the level and intervals for periodic inspections, for the explosion-protected equipment and wiring system.</p> <p>4.2 Procedures are developed to ensure periodic inspections; testing and maintenance are carried out to documented schedule and in accordance with requirements.</p> <p>4.3 Procedures are established for assuring data related to explosion-protection is filed in hazardous area records in accordance with requirements.</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and ensuring the safety of hazardous areas. The extent of the essential knowledge and skills required is given Volume 2 Part 2, Section 2:

2.19.1 Hazardous areas and explosion-protection principles

2.19.19 Hazardous areas management

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be

required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Ensure the safety of hazardous areas as described in 7) and including:
    - A Currency in the critical prerequisite requirements

related to the safe working principles and practices

- B Applying relevant statutory requirements
- C Establishing procedures for engaging competent persons
- D Establishing and maintaining procedures for identifying potentially explosive hazards
- E Establishing procedures for implementing and maintaining explosion-protection strategies
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in ensuring the safety of hazardous areas.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence development in this unit may be arranged concurrently with competencies in plant management.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3; 2.2	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 4.2; 4.3	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3; 2.1	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2; 4.1; 4.3	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM014A Design and develop modifications to explosion-protected equipment**

### **Unit Descriptor**

**1)**

This unit covers the explosion-protection aspects of designing and developing modifications to explosion-protected equipment. It requires the abilities in technical design and compliance assessments and documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competence in this unit shall be assessed only after competencies in general plant management have been achieved.

UEENEEM007A Overhaul and repair explosion protected equipment

This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable

contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare for modification of equipment.

1.1 Instructions on modification are received and expected outcomes of the work confirmed with appropriate personnel.

1.2 Certification documents for the equipment are sought and received in order to check that the equipment complies with the certification.

1.3 Where certification documents for the equipment are not available arrangements are made to seek re-certification in accordance with requirements.

1.4 Tools, measuring/testing devices and equipment needed to check compliance with certification and determine the extent of the work are obtained and checked for correct, accurate and safe operation.

2 Determine the level of modification.

2.1 Measurements, tests and inspections are carried out on the equipment in accordance with OHS policies and procedures and other established procedures.

2.2 The extent of work to be done is determined from measurement, test and inspection results and the requirements of Standards.

3 Design modifications.

3.1 Modifications are designed to comply with the requirements of Standards.

3.2 Specifications and instructions for the modification work are documented and processed in accordance with requirements.

4 Establish the need for re-certification.

4.1 Need for supplementary certification or re-certification is determined in accordance with requirements.

4.2 Level of testing required after equipment is modified is determined in accordance with requirements.

5	Arrange modification work.	5.1	Arrangements are made for the modification work to be done in accordance with established procedures.
		5.2	A copy of modification specifications and instructions is provided to personnel responsible for carrying out the work.
6	Arrange assessment of modified equipment.	6.1	Arrangements are made to obtain supplementary approval and/or re-certification for the modified equipment in accordance with requirements.
		6.2	Arrangements are made for non-compliance and non-conformances found during testing and the assessment of modified equipment to be rectified in accordance with established procedures.
7	Document certification of modified equipment.	7.1	Equipment marking is checked and, where applicable, marked according to certification documentation and requirements.
		7.2	Modification work is documented in accordance with established procedures and requirements.
		7.3	Documentation of the modification work is filed in hazardous area records and a copy issued with the equipment.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and developing modifications to explosion-protected equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.19.1 Hazardous areas and explosion-protection principles
- 2.19.2 Explosion-protected equipment
- 2.19.3 Flameproof (Ex'd') explosion-protection technique
- 2.19.4 Increased safety (Ex'e') explosion-protection technique
- 2.19.5 Non-sparking (Ex'n') explosion-protection technique
- 2.19.6 Intrinsic safety (Ex'i') explosion-protection technique

- 2.19.7 Pressurization (Ex‘p’) explosion-protection technique
- 2.19.8 Explosion-protection techniques for dusts
- 2.19.9 Common characteristics of explosion-protection techniques
- 2.19.13.1 Explosion protected equipment overhaul and repair, general requirements
- 2.19.13.2 Overhaul and repair requirements specific to each explosion-protection technique
- 2.19.14.1 Explosion-protected equipment modification, general requirements
- 2.19.14.2 Modification requirements specific to each explosion-protection technique

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and must be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex ‘d’].
- Increased safety [Ex ‘e’].
- Non-sparking [Ex ‘n’].
- Intrinsic safety [Ex ‘i’].
- Pressurization [Ex ‘p’].
- Dust-exclusion enclosures [Ex ‘tD’].
- Pressurization, dust [Ex ‘pD’].
- Encapsulation, dust [Ex ‘mD’].
- Intrinsic safety, dust [Ex ‘iD’].

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## **Critical aspects of evidence required to**

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### **8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design and develop modifications to explosion protected equipment as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices
    - B Following OHS procedures.
    - C Interpreting certification documentation and Standards.
    - D Checking equipment for compliance with certification and Standards.
    - E Specifying modification design.
    - F Establishing need for re-certification.
    - G Documenting modification design.
    - H Using quality management systems
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing and developing modifications to explosion-protected equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with competencies in plant management.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  2.1; 3.2; 4.2	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.2; 1.4; 2.2; 4.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.1; 2.2; 3.1; 4.1; 4.2	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  1.3; 2.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.4; 2.1; 3.1; 4.2	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEM015A Classify hazardous areas

### Unit Descriptor

1)

This unit covers knowledge and skills to classify areas where potentially explosive materials may exist. It requires the ability to gather and analyse data relative to explosion hazards, determine the extent of risk and establish and document zones delineating the levels of risk.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the competencies have been granted in relation to gathering and analysing technical data and using this data for risk assessment. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
1 Determine the type and extent of explosion hazard.	<p>1.1 Functions and process equipment in the area are determined and hazardous materials identified from specifications, hazard and risk assessment and/or written consultation with process specialist personnel.</p> <p>1.2 Explosion and physical properties of hazardous materials are listed, together with the title of the authority from which the data is obtained.</p> <p>1.3 Gas Groupings and temperature class of flammable gases and vapours that may be present in the area are established from collected data.</p> <p>1.4 Potential sources of release are identified from specifications, risk assessment and/or written consultation with process specialist personnel.</p> <p>1.5 Likely impact of any risk of an explosion affecting the environment is assessed in accordance with requirements and established procedures.</p>
2 Establish the type and extent of classes/zones.	<p>2.1 Zones are determined by similarity to examples in standards or from first principles.</p> <p>2.2 Where first principles are used, grades, sources and magnitude of release are established from specifications and diagrams and reviewed with process specialist personnel.</p>
3 Document classification and delineation of zones.	<p>3.1 Area classification documentation is completed in accordance with requirements and submitted to appropriate personnel.</p> <p>3.2 Classification documentation records are for future reference and in accordance with requirements.</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and classifying hazardous areas. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.19.1 Hazardous areas and explosion-protection principles

2.19.17 Hazardous areas classification techniques

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any hazardous areas in which the classification cannot be directly identified by common situations or specific examples.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access

to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Classify hazardous areas as described in 7) and including:

- A Currency in the critical prerequisite requirements related to the safe working principles and practices
- B Accessing necessary information and identifying hazardous products involved in a given process, explosive properties of materials involved in a given process, and potential sources and characteristics of release of hazardous products
- C Analysing data in the context of explosion risk
- D Determining area delineation and documenting area classifications
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in classifying hazardous areas.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with competencies related to gathering and analysing technical data and using this data for assessing risk.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5; 2.2; 3.1; 3.2	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.1; 1.5; 2.2	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:	

	2.1; 2.3	1
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEM016A Design electrical installations in hazardous areas

### Unit Descriptor

1)

This unit covers the explosion-protection aspects planning electrical installations for hazardous areas. It requires the ability to identify hazardous area zones from classification diagrams, identical examples of previously classified areas or those given in standards and to select and locate explosion-protected equipment and wiring systems and other items that may influence the explosion-protection technique.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has been confirmed.

UEENEEM004A Install explosion-protected equipment and wiring systems

This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during

training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1 Verify hazardous classification for the area.

- 1.1 Nature and characteristics of explosion hazards in the area are identified from plant specifications.
- 1.2 In the absence of classification documentation, arrangements are made to ensure the explosion hazard in the area is assessed and the area classified.
- 1.3 Classification, extent of zonings of the area, gas groups and temperature class are verified by reference to classification documents or determined from Standards in which the explosion hazard area classification and zonings are clearly identified.
- 1.4 Area classification determined from standards in which the explosion hazard area classification and zonings are clearly identified is documented in accordance with requirements.

2 Select and check equipment, wiring and accessories.

- 2.1 Equipment and accessories are selected to suit area activities and comply with explosion-protection requirements.
- 2.2 Wiring systems are selected to suit area activities, and comply with explosion-protection, load and duty requirements.
- 2.3 Equipment compliance certification is checked for suitability for the area classification and zonings.
- 2.4 Cables and accessories are checked for suitability for the area classification and zonings and load and duty requirements.

3 Document design.

- 3.1 Design and specifications are documented in accordance with established procedures and requirements.

- 3.2 Arrangements are made to file design documentation in hazardous area records in accordance with established procedures and requirements.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing electrical installations in hazardous areas. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.19.1 Hazardous areas and explosion-protection principles
- 2.19.2 Explosion-protected equipment
- 2.19.3 Flameproof (Ex'd') explosion-protection technique
- 2.19.4 Increased safety (Ex'e') explosion-protection technique
- 2.19.5 Non-sparking (Ex'n') explosion-protection technique
- 2.19.6 Intrinsic safety (Ex'i') explosion-protection technique
- 2.19.7 Pressurization (Ex'p') explosion-protection technique
- 2.19.8 Explosion-protection techniques for dusts
- 2.19.9 Common characteristics of explosion-protection techniques
- 2.19.10 Hazardous areas installation and maintenance requirements
- 2.19.15 Hazardous areas installation planning
- 2.19.16 Common classified hazardous areas

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and will be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated

with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex ‘d’].
- Increased safety [Ex ‘e’].
- Non-sparking [Ex ‘n’].
- Intrinsic safety [Ex ‘i’].
- Pressurization [Ex ‘p’].
- Dust-exclusion enclosures [Ex ‘tD’].
- Pressurization, dust [Ex ‘pD’].
- Encapsulation, dust [Ex ‘mD’].
- Intrinsic safety, dust [Ex ‘iD’].

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design electrical installations in hazardous areas as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices

- B Interpreting area classification documentation.
- C Classifying area from Standards.
- D Documenting area classification.
- E Selecting equipment for a given classified area.
- F Selecting wiring systems for a given classified area.
- G Checking equipment certification for suitability for a given classified area
- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing electrical installations in hazardous areas.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEM004A Install explosion-protected equipment and wiring systems

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1; 2.3; 2.4	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEM017A Design explosion-protected electrical systems**

### **Unit Descriptor**

**1)**

This unit covers the explosion-protection aspects of design electrical systems. It requires the ability to establish design briefs and to pursue economical and effective design solutions.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit shall be assessed only after the competencies have been granted in designing electrical systems and installations. This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

1	Establish design brief.	1.1	Site and plant specifications are obtained and reviewed to establish the system requirements.
		1.2	Classification of the area is obtained from the hazardous area layout drawings or other classification documents.
		1.3	Organizational policies and specifications for hazardous area electrical systems are obtained or established with the appropriate personnel.
2	Design system and installation.	2.1	Safety, functional and economic considerations are incorporated in system design.
		2.2	Design complies with all hazardous area requirements and includes specifications and all other necessary documentation for explosion-protected equipment, accessories and wiring systems.
3	Check and finalise design.	3.1	Design is checked under established procedures for compliance with all relevant requirements.
		3.2	Design is submitted for appropriate organizational approval and, where applicable, statutory or regulatory approval.
		3.3	Approved copies of design documents are issued for retention in hazardous area records in accordance with established procedures and requirements.

**REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing explosion-protected electrical systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.19.1 Hazardous areas and explosion-protection principles

- 2.19.2 Explosion-protected equipment
- 2.19.3 Flameproof (Ex ‘d’) explosion-protection technique
- 2.19.4 Increased safety (Ex ‘e’) explosion-protection technique
- 2.19.5 Non-sparking (Ex ‘n’) explosion-protection technique
- 2.19.6 Intrinsic safety (Ex ‘i’) explosion-protection technique
- 2.19.7 Pressurization (Ex ‘p’) explosion-protection technique
- 2.19.8 Explosion-protection techniques for dusts
- 2.19.9 Common characteristics of explosion-protection techniques
- 2.19.10 Hazardous areas installation and maintenance requirements
- 2.19.15 Hazardous areas installation planning
- 2.19.16 Common classified hazardous areas
- 2.19.20 Explosion-protected electrical systems design
- 2.19.25 Gas detection-fixed equipment

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to any classified hazardous area and explosion-protection techniques and will be endorsed for each technique in which competency is demonstrated. The endorsement(s) for each explosion-protection technique is designated with an [Ex ] as a suffix to the unit title. The unit endorsements are as follows:

- Flameproof [Ex ‘d’].
- Increased safety [Ex ‘e’].
- Non-sparking [Ex ‘n’].
- Intrinsic safety [Ex ‘i’].
- Pressurization [Ex ‘p’].

- Dust-exclusion enclosures [Ex ‘tD’].
- Pressurization, dust [Ex ‘pD’].
- Encapsulation, dust [Ex ‘mD’].
- Intrinsic safety, dust [Ex ‘iD’].

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment

instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner's performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design explosion-protected electrical systems as described in 7) and including:
    - A Currency in the critical prerequisite requirements related to the safe working principles and practices
    - B Accessing and interpreting relevant information.
    - C Providing design options and justifications including hazard risk, functionality and economic considerations.
    - D Following checking and documentation procedures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing explosion-protected electrical systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort competency development in this unit may be arranged concurrently with competencies in designing electrical systems and installations, at AQF Certificate VI level or higher.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  2.1; 2.2	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 3.1; 3.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1; 2.2	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.1; 3.2	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEM018A Design gas detection systems

### Unit Descriptor

1)

This unit covers the selection aspects of gas detection equipment for the design of gas detection systems for hazardous areas. It requires the ability to establish equipment parameters and to evaluate these against manufacturer specifications.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the competencies have been granted in designing electrical systems and installations.

UEENEEM017A Design explosion-protected electrical systems

This is to be augmented with evidence to confirm that the prerequisites related to specific and critical safe working principles and practices are current.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Other conditions related to communications, electrical work, fire protection, gas work, high voltage work, refrigeration/air conditioning and security may apply in some jurisdictions subject to regulations. Practice in the workplace and during training is also subject to regulations directly related to

Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Hazards

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.	
1 Establish gas detection parameters.	1.1	Requirements for gas detection are obtained or established with the appropriate personnel.
	1.2	The parameters for gas detection are obtained and documented from consultation with appropriate personnel.
	1.3	An explosion-protection requirement for gas detection equipment is established from area classification documents.
2 Select gas detection equipment.	2.1	Manufacturer specification and limitations of appropriate gas equipment are sought.
	2.2	Manufacturer specification and limitations are compared with the established parameters for gas detection.
	2.3	Gas detection equipment is selected on compatibility with the established parameters and economic considerations.
3 Document details of gas detection equipment to be used.	3.1	Proposed gas detection equipment is checked under established procedures for compliance with all relevant requirements.
	3.2	A complete specification for gas detection equipment to be used is documented in accordance with established procedures.

**REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing gas detection systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.19.1 Hazardous areas and explosion-protection principles

- 2.19.2 Explosion-protected equipment
- 2.19.3 Flameproof (Ex ‘d’) explosion-protection technique
- 2.19.4 Increased safety (Ex ‘e’) explosion-protection technique
- 2.19.5 Non-sparking (Ex ‘n’) explosion-protection technique
- 2.19.6 Intrinsic safety (Ex ‘i’) explosion-protection technique
- 2.19.7 Pressurization (Ex ‘p’) explosion-protection technique
- 2.19.8 Explosion-protection techniques for dusts
- 2.19.9 Common characteristics of explosion-protection techniques
- 2.19.10 Hazardous areas installation and maintenance requirements
- 2.19.15 Hazardous areas installation planning
- 2.19.16 Common classified hazardous areas
- 2.19.20 Explosion-protected electrical systems design
- 2.19.26 Evaluation and selection of gas detection equipment (portable and fixed)

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to the design of electrical systems for any classified hazardous area.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of the unit and performed in accordance with the Assessment

Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control

measures as specified in the Performance Criteria and Range Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Design gas detection systems as described in 7) and including:
      - A Currency in the critical prerequisite requirements related to the safe working principles and practices
      - B Accessing and interpreting gas detection needs and parameters.
      - C Providing selection options based on parameters and economic considerations.
      - D Following checking and documentation procedures.
      - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should also be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing gas detection systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment primarily intended for learning/assessment which incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort competency development in this unit may be arranged concurrently with competencies in designing electrical systems and installations, at AQF Certificate VI level or higher.

UEENEEM017A      Design explosion-protected electrical systems

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 3.2	1
How is team work used within this	Refer to the following Performance Criteria for examples of application:	

competency?	2.2; 3.1	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.1; 2.2	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  1.2; 2.1; 3.1	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.3; 2.3	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the	Refer to the following Performance Criteria for examples of application:

	meaningful work task	1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1L  
L – Imported Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## ICTTC056C

## Install telecomm network equipment

### Scope/Descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths, ie cable, optic fibre, radio, microwave and satellite.

The unit applies to installation of both new, additional and replacement equipment.

Termination of cables are covered broadly in this standard and thus it should be read in conjunction with Telecommunications Cabling Competency Standards:

Unit ICTTC008C – Terminate metallic conductor cable

Unit ICTTC010C – Place, secure and terminate optical fibre cable

Unit ICTTC011C – Place, secure and terminate coaxial cable.

**IMPORTANT NOTES:** Notes for the use of this imported Competency Standard Unit within this national Training Package:

1. This latest Competency Standard Unit has been selected by the Industry for inclusion in the Electrotechnology Training Package (UEE06).
2. This Unit is drawn from the Information Communication Training Package (ICT02).
3. The Industry would prefer that the most current version of this unit be used. That is, the most current version used in the Information Communication Training Package (ICT02).
4. Where the current unit in the origin national Training Package is superseded or deleted the Industry would prefer the latest NTIS archived version of this unit be used in its place.

For the latest version of this unit from its origin national Training Package, RTOs are directed to locate the unit on the NTIS via the following link: <http://www.ntis.gov.au>

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- accessing the ISC/Training Package Developer ([www.ee-oz.com.au](http://www.ee-oz.com.au)) or Australian Training Products (ATP) (<http://www.atpl.net.au>) website and comparing the version identifier. This information is displayed in the first few pages of the Training Package.

**ICTTC083C****Locate and rectify complex CPE fault  
(PABX repair)****Scope/Descriptor**

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

**IMPORTANT NOTES:** Notes for the use of this imported Competency Standard Unit within this national Training Package:

1. This latest Competency Standard Unit has been selected by the Industry for inclusion in the Electrotechnology Training Package (UEE06).
2. This Unit is drawn from the Information Communication Training Package (ICT02).
3. The Industry would prefer that the most current version of this unit be used. That is, the most current version used in the Information Communication Training Package (ICT02).
4. Where the current unit in the origin national Training Package is superseded or deleted the Industry would prefer the latest NTIS archived version of this unit be used in its place.

For the latest version of this unit from its origin national Training Package, RTOs are directed to locate the unit on the NTIS via the following link: <http://www.ntis.gov.au>

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## ICTTC085C

## Monitor, analyse and action alarms

### Scope/Descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths, ie cable, optic fibre, radio, microwave and satellite.

**IMPORTANT NOTES:** Notes for the use of this imported Competency Standard Unit within this national Training Package:

1. This latest Competency Standard Unit has been selected by the Industry for inclusion in the Electrotechnology Training Package (UEE06).
2. This Unit is drawn from the Information Communication Training Package (ICT02).
3. The Industry would prefer that the most current version of this unit be used. That is, the most current version used in the Information Communication Training Package (ICT02).
4. Where the current unit in the origin national Training Package is superseded or deleted the Industry would prefer the latest NTIS archived version of this unit be used in its place.

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**ICTTC088C****Locate and rectify network faults****Scope/Descriptor**

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths, ie cable, optic fibre, radio, microwave and satellite.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

**IMPORTANT NOTES:** Notes for the use of this imported Competency Standard Unit within this national Training Package:

1. This latest Competency Standard Unit has been selected by the Industry for inclusion in the Electrotechnology Training Package (UEE06).
2. This Unit is drawn from the Information Communication Training Package (ICT02).
3. The Industry would prefer that the most current version of this unit be used. That is, the most current version used in the Information Communication Training Package (ICT02).
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For the latest version of this unit from its origin national Training Package, RTOs are directed to locate the unit on the NTIS via the following link: <http://www.ntis.gov.au>

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## UETTDRIS04A

### Perform high voltage field switching operation to a given schedule

#### Scope/Descriptor

This Unit covers the carrying out of high voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule and according to enterprise procedures. It also encompasses the process of communicating with the Switching Control Officer or Electrical Control Officer, isolating the electrical equipment and the line or work site, as well as proving that the area is de-energised and earthed, issuing/accepting electrical permits and the returning of the affected circuits to service.

**IMPORTANT NOTES:** Notes for the use of this imported Competency Standard Unit within this national Training Package:

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2. This Unit is drawn from the ESI – Transmission, Distribution and Rail Training Package (UET05).
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## BSBCMN306A Produce business documents

### Scope/Descriptor

This unit covers the skills and knowledge required to produce various business documents. It includes the skills and knowledge required to select and use a range of functions on a computer application.

This unit relates to BSBCMN213A Produce simple word processed documents and BSBCMN405A Analyse and present research information. Consider co-assessment with BSBCMN305A Organise workplace information.

**IMPORTANT NOTES:** Notes for the use of this imported Competency Standard Unit within this national Training Package:

5. This latest Competency Standard Unit has been selected by the Industry for inclusion in the Electrotechnology Training Package (UEE06).
6. This Unit is drawn from the Business Services national Training Package (BSB01).
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## **BSBSBM405A Monitor and manage business operations**

### **Scope/Descriptor**

This unit is concerned with the operation of the business and with implementing the business plan. The strategies involve monitoring, managing and reviewing operational procedures. It is suitable for existing micro and small businesses or a department in a larger organisation.

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## PMBQUAL390A Solve problems using ‘quality tools’

### Scope/Descriptor

This competency covers the solving of process and other problems, beyond those associated directly with the process unit, using a structured approach such as problem solving tools and techniques to achieve the organisation's quality objectives.

The competency is typically performed by an experienced operator, leading hand or supervisor.

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## **BSBFML503B      Manage effective workplace relationships**

### **Scope/Descriptor**

This unit replaces BSBFLM503A Establish effective workplace relationships.

Frontline management plays an important role in developing and maintaining positive relationships in internal and external environments so that employees, customers, suppliers and the organisation achieve planned outputs/outcomes. At this level, work will normally be carried out within complex and diverse methods and procedures which require the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies. This unit builds on BSBFLM403B Implement effective workplace relationships. Consider co-assessment with BSBFLM512A Ensure team effectiveness

**IMPORTANT NOTES:** Notes for the use of this imported Competency Standard Unit within this national Training Package:

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## BSBFLM506B Manage workplace information systems

### Scope/Descriptor

This unit replaces BSBFLM506A Manage workplace information systems.

The competency of frontline management in identifying, acquiring, analysing and using appropriate information plays a significant part in the organisation's effectiveness. At this level, work will normally be carried out within complex and diverse methods and procedures which require the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies. This unit builds on BSBFLM406B Implement workplace information system. Consider co-assessment with BSBFLM505B Manage operational plan, BSBFLM507B Manage quality customer service, BSBMGT505A Ensure a safe workplace, BSBFLM509B Promote continuous improvement and BSBFLM512A Ensure team effectiveness.

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## **BSBFLM509B Facilitate continuous improvement**

### **Scope/Descriptor**

This unit replaces BSBFLM509A Promote continuous improvement.

Frontline managers have an active role in managing the continuous improvement process in achieving the organisation's objectives. Their position, closely associated with the creation and delivery of products and services, means that they play an important part in influencing the on-going development of the organisation. At this level, work will normally be carried out within complex and diverse methods and procedures which require the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies. This unit builds on BSBFLM409A Implement continuous improvement. Consider co-assessment with BSBFLM512B Ensure team effectiveness, BSBFLM505B Manage operational plan, BSBFLM507B Manage quality customer service, BSBMGT505A Ensure a safe workplace, BSBFLM510B Facilitate and capitalise on change and innovation, and BSBFLM511B Develop a workplace learning environment.

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## BSBFLM510B Facilitate and capitalise on change and innovation

### Scope/Descriptor

This unit replaces BSBFLM510A Facilitate and capitalise on change and innovation. Frontline management has an active role in fostering change and acting as a catalyst in the implementation of change and innovation. They have a creative role in ensuring that individuals, the team and the organisation gain from change; and that the customer benefits through improved products and services. At this level, work will normally be carried out within complex and diverse methods and procedures which require the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies. This unit builds on BSBCMN412A Promote innovation and change. Consider co-assessment with BSBFLM512A Ensure team effectiveness, BSBFLM505B Manage operational plan, and BSBFLM509B Promote continuous improvement.

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## **BSBFLM512A      Ensure team effectiveness**

### **Scope/Descriptor**

This unit replaces BSBFLM502A Provide leadership in the workplace and BSBFLM504A Facilitate work teams, which have been combined to create this unit. Frontline management has an important facilitative role in the development and empowerment of work teams. This will be evident in the way Frontline managers work with teams and individuals, work across teams and the initiative they take in strengthening the links between teams and the organisations management. At this level, work will normally be carried out within complex and diverse methods and procedures which require the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies. This unit builds on BSBFLM412A Promote team effectiveness.

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## EPOPS234A Perform Routine Oxyacetylene (Fuel Gas) Welding (OAW)

### Scope/Descriptor

This Unit deals with the skills and knowledge required to be applied in a maintenance environment where welding is not required to meet Australian Standard 1554 general purpose or equivalent Codes and/or licensing requirements.

This Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**IMPORTANT NOTES:** Notes for the use of this imported Competency Standard Unit within this national Training Package:

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## UEPOPS235A Perform Routine Manual Arc Welding

### Scope/Descriptor

This Unit deals with the skills and knowledge required to be applied in a maintenance environment where welding is not required to meet Australian Standard 1554 general purpose or equivalent Codes and/or licensing requirements.

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## UEPOPS236A Perform Manual Heating Thermal Cutting and Gouging

### Scope/Descriptor

This Unit deals with the skills and knowledge required to be applied in a maintenance environment and would be used to facilitate a wide range of maintenance activities.

This Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

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TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.11  
I – Instrument Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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# UEENEEI001A Install and set up transducers and sensing devices

## Unit Descriptor

1)

This unit covers the installation and setting up of transducers and sensors. It encompasses working safely and to installation standards, matching equipment with that specified for a given location, placing and securing equipment accurately, making required pneumatic, hydraulic and electrical circuit connections, adjusting and setting up devices to specifications and manufacturer instructions and completing the necessary installation documentation.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE005A Fix and secure equipment

UEENEEE007A Use drawings, diagrams, schedules and service manuals

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	2	Writing	2	Numeracy	2
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## Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to install and set up transducers and sensing devices

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Installation of transducer and sensing devices are prepared in consultation with others affected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or appropriate person(s) to establish the scope of work to be undertaken.
- 1.6 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.

- 1.7 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
- 1.8 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.9 Preparatory work is checked to ensure no damage has occurred and that work complies with requirements.
- 2 Install and set up transducers and sensing devices
  - 2.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
  - 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
  - 2.4 Transducers and sensing devices are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance.
  - 2.5 Wiring and tubing is terminated at transducers and sensing devices in accordance with manufacture’s specifications and functional and regulatory requirements.
  - 2.6 Transducers and sensing devices are adjusted and set up drawing on knowledge of measurement and detection parameters applicable to the particular types and in accordance with regulatory requirements and manufacturer instructions
  - 2.7 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
  - 2.8 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.9 Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.

- |   |  |   |  |
|---|--|---|--|
|   | 2.10   | Apparatus installation is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles. |  |
| 3 | Completion and report installation and setting up activities | 3.1   | OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2   | Work site is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3   | Final checks are made to that the installed devices conform to requirements.   |
|   |  | 3.4   | ‘As-installed’ transducers and sensing devices are documented and appropriate person(s) notified in accordance with established procedures |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and setting up transducers and sensing devices. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- |  |         |  |
|--|---------|--|
|  | 2.1.4   | Basic cable and conductor terminations   |
|  | 2.3.4   | Pneumatic/hydraulic control tubing/piping  |
|  | 2.5.14  | Technical standards, regulations and codes applicable to instrumentation and control |
|  | 2.12.1  | Instrumentation principles   |
|  | 2.12.23 | Transducers and sensing devices  |
|  | 2.18.1  | Occupational Health and Safety principles  |
|  | 2.18.7  | Instrumentation safe working practices   |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to at least two different types of transducers and two different types of sensing devices.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and set up transducers and sensing devices as described in 7) and including:
    - A Reading and interpreting drawings related to and device locations
    - B Placing and securing devices accurately
    - C Connecting apparatus and associated equipment to comply with requirements
    - D Setting up and adjusting transducers and sensing devices to requirements
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note: Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and setting up transducers and sensing devices.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note: Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE007A Use drawings, diagrams, schedules and service manuals
- UEENEEI007A Install process instrumentation and control cabling and tubing

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 2.9

## UEENEEI002A Solve problems in pressure measurement systems

### Unit Descriptor

1)

This unit covers setting up pressure measuring systems and providing solutions to pressure measurement problems as they apply to various process and control work functions. It encompasses working safely, setting up and calibrating pressure measuring systems, problem solving techniques, the use of a range of measuring devices, providing solutions derived from measurements and calculations to predictable problems in pressure measurement systems.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI001A Install and set up transducers and sensing devices

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. The unit may also be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the work place. However they are subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on pressure measurement systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the pressure measurement problem is obtained from documentation or from an appropriate person to establish the scope of work to be undertaken.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved or affected by the work.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve pressure measurement problems

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure any electrical components live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Pressure measurement apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Established methods are used to solve measurement problems from tests and calculated values as they apply to pressure measurement systems

	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person
	2.6	Problems are solved using sustainable energy principles and without damage to apparatus, the surrounding environment or services
3	Complete work and document work activities	
	3.1	OHS work completion risk control measures and procedures are followed
	3.2	Work site is cleaned and made safe in accordance with established procedures
	3.3	Written justification is made for solutions to pressure measurement problems
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established procedures

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in pressure measurement systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.11.12	Instrumentation testing and measuring field devices
2.12.2	Pressure
2.18.1	Occupational Health and Safety principles
2.18.7	Instrumentation safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to pressure measurement apparatus and systems as they apply to chemical, industrial or medical processes associated with installation, fault finding, maintenance or development work functions, and at least three of the following types pressure measurement problems on at least two occasions:

- Determining the operating parameters of a pressure measuring system
- Setting up and calibrating a pressure measuring system
- Alternating an existing pressure measuring system to comply with specified operating parameters
- Developing a pressure measuring system to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points

are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in pressure measurement systems as described in 7) and including:
    - A Determining the operating parameters of a pressure measuring system
    - B Setting up and calibrating a pressure measuring system
    - C Alternating an existing pressure measuring system to comply with specified operating parameters
    - D Developing a pressure measuring system to comply with a specified function and operating parameters

- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in pressure measurement systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- |             |  |
|-------------|--|
| UEENEEE007A | Use drawings, diagrams, schedules and service manuals          |
| UEENEEI007A | Install process instrumentation and control cabling and tubing |

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2,

Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.1	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEI003A Solve problems in density/level measurement systems

### Unit Descriptor

1)

This unit covers setting up density/level measuring systems and providing solutions to density/level measurement problems as they apply to various process and control work functions. It encompasses working safely, setting up and calibrating density/level measuring systems, problem solving techniques, the use of a range of measuring devices, providing solutions derived from measurements and calculations to predictable problems in density/level measurement systems.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI002A Solve problems in pressure measurement systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. The unit may also be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the work place. However they are subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on density/level measurement systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the density/level measurement problem is obtained from documentation or from an appropriate person to establish the scope of work to be undertaken.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved or affected by the work.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve density/level measurement problems

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure any electrical components live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Density/level measurement apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Established methods are used to solve measurement problems from tests and calculated values as they apply to density/level measurement systems.

	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Problems are solved using sustainable energy principles and without damage to apparatus, the surrounding environment or services.
3	Complete work and document work activities	
	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Written justification is made for solutions to density/level measurement problems.
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established procedures.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in density/level measurement systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.11.12	Instrumentation testing and measuring field devices
2.12.3	Density/level
2.18.1	Occupational Health and Safety principles
2.18.7	Instrumentation safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to the density/level measurement apparatus and systems as they apply to chemical, industrial or medical processes associated with installation, fault finding, maintenance or development work functions, and at least three of the following types density/level measurement problems on at least two occasions:

- Determining the operating parameters of a density/level measuring system
- Setting up and calibrating density/level measuring system
- Alternating an existing density/level measuring system to comply with specified operating parameters
- Developing a density/level measuring system to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points

are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in density/level measurement systems as described in 7) and including:
    - A Determining the operating parameters of a density/level measuring system
    - B Setting up and calibrating a density/level measuring system
    - C Alternating an existing density/level measuring system to comply with specified operating parameters
    - D Developing a density/level measuring system to comply with a specified function and operating parameters

- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in density/level measurement systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

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UEENEEI002A	Solve problems in pressure measurement systems
UEENEEI004A	Solve problems in flow measurement systems
UEENEEI005A	Solve problems in temperature measurement systems

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.1	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling 8.7)**

**Employment**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.1 to1 .6; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEI004A Solve problems in flow measurement systems

### Unit Descriptor

1)

This unit covers setting up flow measuring systems and providing solutions to flow measurement problems as they apply to various process and control work functions. It encompasses working safely, setting up and calibrating flow measuring systems, problem solving techniques, the use of a range of measuring devices, providing solutions derived from measurements and calculations to predictable problems in flow measurement systems.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI002A Solve problems in pressure measurement systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. The unit may also be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the work place. However they are subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on flow measurement systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the flow measurement problem is obtained from documentation or from an appropriate person to establish the scope of work to be undertaken.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved or affected by the work.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve flow measurement problems

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure any electrical components live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Flow measurement apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Established methods are used to solve measurement problems from tests and calculated values as they apply to flow measurement systems.

	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Problems are solved using sustainable energy principles and without damage to apparatus, the surrounding environment or services.
3	Complete work and document work activities	<p>3.1 OHS work completion risk control measures and procedures are followed.</p> <p>3.2 Work site is cleaned and made safe in accordance with established procedures.</p> <p>3.3 Written justification is made for solutions to flow measurement problems.</p> <p>3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures.</p>

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in flow measurement systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.11.12	Instrumentation testing and measuring field devices
2.12.4	Fluid flow principles
2.18.1	Occupational Health and Safety principles
2.18.7	Instrumentation safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to the flow measurement apparatus and systems as they apply to chemical, industrial or medical processes associated with installation, fault finding, maintenance or development work functions, and, and at least three of the following types flow measurement problems on at least two occasions:

- Determining the operating parameters of a flow measuring system
- Setting up and calibrating a flow measuring system
- Alternating an existing flow measuring system to comply with specified operating parameters
- Developing a flow measuring system to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points

are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in flow measurement systems as listed as described in 7) and including:
    - A Determining the operating parameters of a flow measuring system
    - B Setting up and calibrating a flow measuring system
    - C Alternating an existing flow measuring system to comply with specified operating parameters
    - D Developing a flow measuring system to comply with a specified function and operating parameters
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in flow measurement systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- |             |   |
|-------------|---|
| UEENEEI002A | Solve problems in pressure measurement systems      |
| UEENEEI003A | Solve problems in density/level measurement systems |
| UEENEEI005A | Solve problems in temperature measurement systems   |

The critical aspects of occupational health and safety covered in UEENEEI001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4; 2.1	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills

enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEI005A Solve problems in temperature measurement systems

### Unit Descriptor

1)

This unit covers setting up temperature measuring systems and providing solutions to temperature measurement problems as they apply to various process and control work functions. It encompasses working safely, setting up and calibrating temperature measuring systems, problem solving techniques, the use of a range of measuring devices, providing solutions derived from measurements and calculations to predictable problems in temperature measurement systems.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI001A Install and set up transducers and sensing devices

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
---------	---	---------	---	----------	---

### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. The unit may also be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the work place. However they are subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to work on temperature measurement systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the temperature measurement problem is obtained from documentation or from an appropriate person to establish the scope of work to be undertaken.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved or affected by the work.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve temperature measurement problems

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure any electrical components live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Temperature measurement apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Established methods are used to solve measurement problems from tests and calculated values as they apply to flow measurement systems.

	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Problems are solved using sustainable energy principles and without damage to apparatus, the surrounding environment or services.
3	Complete work and document work activities	
	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Written justification is made for solutions to flow measurement problems.
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established procedures.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in temperature measurement systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.11.12	Instrumentation testing and measuring field devices
2.12.5	Temperature principles
2.18.1	Occupational Health and Safety principles
2.18.7	Instrumentation safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to temperature measurement apparatus and systems as they apply to chemical, industrial or medical processes associated with installation, fault finding, maintenance or development work functions, and, and at least three of the following types temperature measurement problems on at least two occasions:

- Determining the operating parameters of a temperature measuring system
- Setting up and calibrating a temperature measuring system
- Alternating an existing temperature measuring system to comply with specified operating parameters
- Developing a temperature measuring system to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points

are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in temperature measurement systems as listed as described in 7) and including:
    - A Determining the operating parameters of a temperature measuring system
    - B Setting up and calibrating a temperature measuring system
    - C Alternating an existing temperature measuring system to comply with specified operating parameters
    - D Developing a temperature measuring system to comply with a specified function and operating parameters

- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in temperature measurement systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEI002A Solve problems in pressure measurement systems

UEENEEI003A Solve problems in density/level measurement systems

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.1	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEI006A **Solve problems in process controllers, transmitters and converters**

### Unit Descriptor

1)

This unit covers providing solutions to predictable problems in process controllers, transmitters and converters. It encompasses working safely, applying logical problem solving procedures, evaluating performance, the use of measuring devices, providing solutions to predictable control problems, and documenting solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI003A Solve problems in density/level measurement systems

UEENEEI004A Solve problems in flow measurement systems

UEENEEI005A Solve problems in temperature measurement systems

And any one of the following:

UEENEEG002A Solve problems in single and three phase low voltage circuits

OR

UEENEEH014A Solve problems in frequency dependent circuits

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved

contracts of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Instruments

**ELEMENT PERFORMANCE CRITERIA**

<p>5) Elements describe the essential outcomes of a unit of competency</p>	<p>Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.</p>
<p>1 Prepare to work on process controllers, transmitters and converters</p>	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 OHS risk control work preparation measures and procedures are followed</p> <p>1.3 The nature of the control problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Sources of materials that may be required for the work are established in accordance with established procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety</p>
<p>2 Solve process controller transmitters and converters problems</p>	<p>2.1 OHS risk control work measures and procedures are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures</p>

- 2.3 Process controller/transmitters/converters and control loops are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Known solutions that include the use of measured and calculated values are used for solving predictable process controller problems.
- 2.5 Written justification is made for solutions used to solve process controller problems.
- 2.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 2.7 Problems are solved without damage to apparatus, the surrounding environment or services and using sustainable energy principles.
- 3 Complete work and provide status report(s)
  - 3.1 OHS risk control work completion measures and procedures are followed.
  - 3.2 Status report(s) is/are completed and work supervisor notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in process controllers, transmitters and converters. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.3.3 Process control principles
- 2.5.10 Technical manuals and catalogues
- 2.5.14 Technical standards, regulations and codes applicable to instrumentation and control
- 2.11.12 Instrumentation testing and measuring field devices
- 2.12.6 Process control systems
- 2.12.10 Transmitters and converters
- 2.18.1 Occupational Health and Safety principles
- 2.18.7 Instrumentation safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to a hydraulic or pneumatic controller and a microprocessor-based controller and solving at least two of the following problems:

- Determining the operating parameters of a controller, in an existing control loop
- Configuring/tuning a controller in an existing control loop to comply with specified operating parameters
- Configuring/tuning a controller to comply with a specified function

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries

risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies & workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in process controllers, transmitters and converters as listed as described in 7) and including:
    - A Determine the operating parameters of a controller in an existing control loop.
    - B Configure/tune a controller in an existing control loop to comply with specified operating parameters.

- C Configure/tune a controller to comply with a specified function
- D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving problems in process controllers, transmitters and converters.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEI002A Solve problems in pressure measurement systems
- UEENEEI003A Solve problems in density/level measurement systems
- UEENEEI004A Solve problems in flow measurement systems
- UEENEEI005A Solve problems in temperature measurement systems

The critical aspects of occupational health and safety covered in UEENEEI001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.5; 3.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.3; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.5; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 1.6

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 2.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEI007A **Install process instrumentation and control cabling and tubing**

### **Unit Descriptor**

1)

This unit covers the installation and termination of instrument and control cabling and tubing for chemical, industrial or food processing systems or equipment used in medical procedures. It encompasses working safely and to standards, routing cables and tubing to specified locations, terminating cables and tubing and connecting wiring at accessories and at instruments and control apparatus and completing the necessary installation documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI001A    Install and set up transducers and sensing devices

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and

typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to install cabling and tubing

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Health and safety risks are identified, and established risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Installation of cabling and tubing is prepared in consultation with other effected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or appropriate person(s) to establish the scope of work to be undertaken.
- 1.6 Cable and tube routes are planned within the constraints of the building and plant structure, significant and regulations.
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
- 1.8 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
- 1.9 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |   |  |
|---|---|--|
|   | 1.10  | Preparatory work is checked to ensure no damage has occurred and that work complies with requirements.   |
| 2 | Install cabling, tubing and accessories       | <p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Plant/machines/equipment are checked as being isolated where necessary in strict accordance OHS requirements and procedures</p> <p>2.3 Cabling, tubing and accessories are installed to comply with technical standards and job specifications and requirements with sufficient excess to affect terminations.</p> <p>2.4 Accessories are installed in the required locations and within acceptable tolerances.</p> <p>2.5 Cables and conductors are terminated at accessories in accordance with manufacture’s specifications and regulatory requirements</p> <p>2.6 Tubing is terminated at accessories in accordance with manufacture’s specifications and regulatory requirements</p> <p>2.7 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.</p> <p>2.8 Unexpected situations are dealt with safely and with the approval of an authorised person.</p> <p>2.9 Ongoing checks of the quality of installed wiring are undertaken in accordance with established procedures.</p> <p>2.10 Cabling and tubing installation is carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or services and using sustainable energy principles.</p> |
| 3 | Completion and report installation activities | <p>3.1 OHS work completion risk control measures and procedures are followed.</p> <p>3.2 Work site is cleaned and made safe in accordance with established procedures.</p> <p>3.3 Final checks are made to that the installed wiring conforms to requirements.</p>   |

- 3.4 'As-installed' cables, tubes and accessories are documented and appropriate person(s) notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing process instrumentation and control cabling and tubing. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.1.3 Cables in buildings, structures and premises
- 2.1.4 Basic cable and conductor terminations
- 2.1.8 Electronic cable and conductor terminations
- 2.3.4 Pneumatic/hydraulic control tubing/piping
- 2.5.14 Technical standards, regulations and codes applicable to instrumentation and control
- 2.18.1 Occupational Health and Safety principles
- 2.18.7 Instrumentation safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to at least three different wiring systems and two types of tubing.

Note:

1. Examples of wiring systems include armoured cable; fire performance cables eg. MIMS; thermoplastic insulated cable; thermoplastic sheathed cable; UTP, FTP, STP and coaxial communications cables.
2. Tubing types include low pressure metallic and non-metallic tubing and high pressure tubing

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of 8.1)

## Assessment

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this unit

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and

associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install process instrumentation and control cabling and tubing as listed as described in 7) and including:
    - A Reading and interpreting drawings related to cable and tube layouts, schedules and process control apparatus locations
    - B Routing, placing and securing cables and tubing to comply with requirements
    - C Placing and securing accessories accurately
    - D Maintaining fire integrity
    - E Terminating cables and tubing to comply with requirements
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing process instrumentation and control cabling and tubing.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEI008A      Install process control apparatus and associated equipment

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4 to 1.8

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEI008A **Install process control apparatus and associated equipment**

### Unit Descriptor

1)

This unit covers the installation of measurement, monitoring and control apparatus and associated equipment. It encompasses working safely and to installation standards, matching equipment with that specified for a given location, placing and securing equipment accurately, making required pneumatic, hydraulic and electrical circuit connections and completing the necessary installation documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI001A      Install and set up transducers and sensing devices

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to process control apparatus and associated equipment

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Installation of apparatus is prepared in consultation with other effected by the work and sequenced appropriately.
- 1.5 The nature and location of the work is determined from documentation or appropriate person(s) to establish the scope of work to be undertaken.
- 1.6 Location of process control apparatus and associated equipment is planned within the constraints of the building structure, significant and regulations.
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others.
- 1.8 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
- 1.9 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |  |  |   |
|---|--|--|---|
|   | 1.10   | Preparatory work is checked to ensure no damage has occurred and that work complies with requirements. |   |
| 2 | Install process control apparatus and associated equipment | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |  | 2.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.  |
|   |  | 2.3  | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures  |
|   |  | 2.4  | Process control apparatus and associated equipment is installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance. |
|   |  | 2.5  | Wiring and tubing is terminated at process control apparatus and associated equipment in accordance with manufacture’s specifications and functional and regulatory requirements.                                     |
|   |  | 2.6  | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.   |
|   |  | 2.7  | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |  | 2.8  | Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.  |
|   |  | 2.9  | Apparatus installation is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.                       |
| 3 | Completion and report installation activities              | 3.1  | OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2  | Work site is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3  | Final checks are made to that the installed apparatus conforms to requirements.   |

- 3.4 'As-installed' apparatus and associated equipment is documented and appropriate person(s) notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing process control apparatus and associated equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |  |
|---------|--|
| 2.1.8   | Electronic cable and conductor terminations  |
| 2.3.4   | Pneumatic/hydraulic control tubing/piping  |
| 2.5.14  | Technical standards, regulations and codes applicable to instrumentation and control |
| 2.12.20 | Process equipment installation requirements and techniques                           |
| 2.18.1  | Occupational Health and Safety principles  |
| 2.18.7  | Instrumentation safe working practices   |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to at least four different process apparatus and associated equipment.

Note:

1. Examples of process systems include pressure measurement apparatus and systems, temperature measurement apparatus and systems, level/density measurement apparatus and systems, flow measurement apparatus and systems, and chemical measurement apparatus and systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of 8.1)

## Assessment

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this unit

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and

associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install process control apparatus and associated equipment as listed as described in 7) and including:
    - A Reading and interpreting drawings related to and apparatus locations and tubing electrical circuit connections.
    - B Placing and securing apparatus accurately
    - C Connecting apparatus and associated equipment to comply with requirements.
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing process control apparatus and associated equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the

Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE007A Use drawings, diagrams, schedules and service manuals

UEENEEI007A Install process instrumentation and control cabling and tubing

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas	Refer to the following Performance Criteria for examples of application:	

and techniques used?	2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8
6	Performing the work task in non-	Refer to the following Performance Criteria for examples of application:

	routine or contingent situations	2.7
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## UEENEEI009A Set up process measuring and control instruments

### Unit Descriptor

1)

This unit covers the calibration of instruments for measuring chemical and physical characteristics as it applies to the control of processes. It encompasses working safely and to standards, following set-up and calibration procedures, testing and reporting.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI006A Solve problems in process controllers, transmitters and converters

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

#### Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to

currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to set-up process measuring instruments

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.5 Measurement parameters are identified by reviewing process requirements and instrument manufacturers service manual.
- 1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety
- 1.7 Preparatory work is checked to ensure no damage has occurred and that work complies with requirements
- 1.8 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 1.9 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures

2 Set-up process measuring instruments

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- |   |   |   |
|---|---|---|
|   | 2.2                                     | Testing/measuring devices are connected and set up in accordance with requirements for a particular control system.   |
|   | 2.3                                     | Measuring instruments are set up and adjusted in accordance with process requirements and instrument manufacturer service manual.   |
|   | 2.4                                     | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.   |
|   | 2.5                                     | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   | 2.6                                     | Setting-up is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles. |
| 3 | Completion and report set-up activities | 3.1 OHS risk control work completion measures and procedures are followed.  |
|   |   | 3.2 Work site is cleaned and made safe in accordance with established procedures.   |
|   |   | 3.3 Adjustment settings are documented and appropriate person(s) notified in accordance with established procedures   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and setting up process measuring and control instruments. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.12.11.1 Industrial processes
- 2.12.14 Indicators and methods of recording process data
- 2.12.15 Gas analysis
- 2.12.16 Water analysis
- 2.12.17 Scientific analysis
- 2.12.18 Weight measurement principles
- 2.12.19 Instrument calibration methods
- 2.18.1 Occupational Health and Safety principles

## 2.18.7 Instrumentation safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to setting up and adjusting two different types of process measuring instruments.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment

method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up process measuring and control instruments as listed as described in 7) and including:
    - A Identifying measurement parameters
    - B Setting-up and adjusting in accordance with process requirements and instrument manufacturer's service manual
    - C Documenting adjustment settings with established procedures

- D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency setting up process measuring and control instruments.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3; 2.4; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4; 2.5

## UEENEEI010A Set up and adjust process control loops

### Unit Descriptor

1)

This unit covers basic setting up and adjustment of controllers and control elements to specified output. It encompasses working safely and to standards, following set-up and adjustment procedures, applying knowledge of process requirements, testing and reporting.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEEI006A Solve problems in process controllers, transmitters and converters

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety

measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to tune control loop

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.5 Control loop parameters are identified by reviewing process specification and equipment manuals.
- 1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety
- 1.7 Preparatory work is checked to ensure no damage has occurred and that work complies with requirements
- 1.8 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 1.9 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures

2 Tune control loop

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Testing/measuring devices are connected and set up in accordance with requirements for a particular control system.

- |   |  |   |
|---|--|---|
|   | 2.3  | Control set-point is established and control loop adjusted in accordance with process specification   |
|   | 2.4  | Process is observed and decisions made in consultation with process operation personnel to readjusted control loop settings to ensure process demand and output quality is met. |
|   | 2.5  | Process control loops are readjusted as required and checked.   |
|   | 2.6  | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.   |
|   | 2.7  | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   | 2.8  | Ongoing checks of the quality of process output are undertaken to ensure control loop is tuned as required.   |
|   | 2.9  | Tuning is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles.           |
| 3 | Completion and report control loop tuning activities | 3.1 OHS risk control work completion measures and procedures are followed.  |
|   |  | 3.2 Work site is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3 Control loop settings are documented and appropriate person(s) notified in accordance with established procedures   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and setting up process measuring and control instruments. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.12.11.1 Industrial processes

2.18.1 Occupational Health and Safety principles

2.18.7 Instrumentation safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall/may be demonstrated in relation to setting-up and adjusting process control loops for optimum stability and the following:

- Proportional response only
- Proportional plus integral
- Proportional plus integral plus derivative

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the

same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up process measuring and control instruments as listed as described in 7) and including:
    - A Identifying control loop parameters
    - B Adjusting control loop to satisfy process demand and quality
    - C Documenting control loop settings with established procedures
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up process measuring and control instruments.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEI002A Solve problems in pressure measurement systems
- UEENEEI003A Solve problems in density/level measurement systems
- UEENEEI004A Solve problems in flow measurement systems
- UEENEEI005A Solve problems in temperature measurement systems
- UEENEEI006A Solve problems in process controllers, transmitters and converters

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.5; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.7

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.4; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.1; 1.4; 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.7

## **UEENEEI011A Find and rectify faults in process control valve and associated equipment**

### **Unit Descriptor**

**1)**

This unit covers finding and repairing faults in control valves, actuators and positioners. It encompasses working safely, interpreting valve specifications, applying knowledge of control valve operating parameters, conducting tests and repairs and completing the necessary service documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit may be assessed with or only after the following competency has been confirmed.

UEENEEI007A Install process instrumentation and control cabling and tubing

UEENEEI008A Install process control apparatus and associated equipment

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to find and repair faults in control valves	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The nature of the fault is obtained from documentation, tests or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.4 The need to test or measure operating systems is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures</p> <p>1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.6 Sources of materials that may be required for the work are established in accordance with established procedures.</p> <p>1.7 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety</p>
2 Find faults in control valves and associated equipment	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures</p> <p>2.3 Fault finding is approached methodically drawing on knowledge of processes, control valves, actuators and positioners using measured and calculated values.</p>

- |   |  |  |
|---|--|--|
|   | 2.4  | Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage  |
|   | 2.5  | Faulty components are rechecked and their fault status confirmed.  |
|   | 2.6  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   | 2.7  | Fault finding activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles. |
| 3 | Rectify faults in control valves and associated equipment        |  |
|   | 3.1  | OHS risk control measures and procedures for carrying out the work are followed.   |
|   | 3.2  | Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures  |
|   | 3.3  | Materials required to rectify faults are sourced and obtained in accordance with established procedures.   |
|   | 3.4  | Rectification and repairs are affected efficiently without damage to other components, apparatus or circuits.  |
|   | 3.5  | Effectiveness of repairs is tested in accordance with established procedures.  |
|   | 3.6  | Apparatus is reassembled, finally tested and prepared for return to service.   |
|   | 3.7  | Repairs are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.                  |
| 4 | Completion and report fault finding and rectification activities |  |
|   | 4.1  | OHS work completion risk control measures and procedures are followed.   |
|   | 4.2  | Work area is cleaned and made safe in accordance with established procedures.  |
|   | 4.3  | Written justification is made for repairs to control valves  |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and rectifying faults in process control valve and associated equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.12.7 Control valve principles
- 2.12.8 Control valve selection
- 2.12.9 Actuators and positioners
- 2.18.1 Occupational Health and Safety principles
- 2.18.7 Instrumentation safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation at least two types of control valves including the associated equipment.

Note:

1. Examples of control valves types (by application) are additive valves, level control valve, temperature control valve, flow control valve and pressure control valve.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Find and rectify faults in process control valve and associated equipment as listed as described in 7) and including:
  - A Using methodical fault finding techniques
  - B Finding faults efficiently
  - C Replacing/rectifying and repairing components without damage
  - D Providing written justification for the repairs
  - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and rectifying faults in process control valve and associated equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.1; 2.7

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEI012A **Verify compliance and functionality of process control installations**

### **Unit Descriptor**

1)

This unit covers pre-commissioning testing and visual inspection for verifying that installed process control apparatus in non-hazardous areas is safe and complies with requirements. It encompasses procedures for safely conducting safety tests, conducting visual inspections, identifying non-compliance defects and reporting requirements.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed only after all other core units and nominated elective units have been achieved.

UEENEEI005A Enter and verify operating instructions in microprocessor equipped devices

UEENEEI010A Set-up and adjust process control loops

UEENEEI013A Select equipment for process control systems

Elective units to a Unit Strand Total of at least 4 from Schedule 3.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment based programs under an approved contract of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions

subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to inspect and test a process control installations

- 1.1 OHS measures for the site are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Documentation or deemed to comply standard on which installation is based is reviewed and understood.
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.6 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety
- 1.7 Preparatory work is checked to ensure no damage has occurred and that work complies with requirements

2 Visually inspect the installation.

2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
  - 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 2.4 Instrument cabling and tubing is checked for suitability for the environments in which they are installed and suitably protected from damage.
  - 2.5 The type and configuration/sizing of instrument cabling and tubing is confirmed as meeting that specified for the installation.
  - 2.6 Evidence that control apparatus complies with safety and installation requirements is cited.
  - 2.7 Marking of control apparatus is checked for accuracy and clarity and compliance with requirements.
- 3 Conduct functional and safety testing.
- 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
  - 3.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
  - 3.4 Where process control apparatus operates at low voltage arrangements are made for an authorised person to conduct and report on all required electrical safety tests.
  - 3.5 Insulation and continuity tests are conducted on process control cabling operating at extra-low voltage.
  - 3.6 Process control tubing/piping is pressure tested in accordance with established practice.
  - 3.7 Functional and test are checks are conducted on all process control apparatus in accordance with established practice.

- |   |                                     |     |   |
|---|-------------------------------------|-----|---|
| 4 | Report inspection and test findings | 4.1 | OHS risk control work completion measures and procedures are followed.                        |
|   |                                     | 4.2 | Work site is cleaned and made safe in accordance with established procedures.                 |
|   |                                     | 4.3 | Non-compliance defects are identified and reported in accordance with established procedures. |
|   |                                     | 4.4 | Recommendations for rectifying defects are made in accordance with established procedures.    |
|   |                                     | 4.5 | Verification documentation is completed in accordance with established procedures.            |

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying compliance and functionality of process control installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.12.21 | Control system installation, testing and verification methods |
| 2.18.1  | Occupational Health and Safety principles                     |
| 2.18.7  | Instrumentation safe working practices                        |

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to verifying compliance and functionality of at least one electrical/electronic and one pneumatic process control installation comprising a measuring transmitter, controller, final control element, indicator and cabling/tubing.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified

- in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Verify compliance and functionality of process control installations as listed as described in 7) and including:
      - A Selecting correct tools and testing equipment.
      - B Identifying visual non-compliance defects
      - C Using effective methods for conducting tests
      - D Identifying non-compliance from test results.
      - E Identifying causes of non-compliance and recommending how these should be rectified.
      - F Completing verification documentation
      - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in verifying compliance and functionality of process control installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.10; 3.4; 3.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5; 2.6; 3.4; 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 4.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.4; 3.5	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4; 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  NA
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## **UEENEEI013A      Select equipment for process control systems**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers selecting equipment for process control systems to meet performance standards. This encompasses the adoption of process control schemes that meet safety and process requirements, selection of control equipment and interconnecting cabling and tubing/piping based on calculated and deemed-to-comply arrangements.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEI010A      Set-up and adjust process control loops</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0"> <tr> <td>Reading</td> <td>4</td> <td>Writing</td> <td>4</td> <td>Numeracy</td> <td>4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry level employment based programs incorporated in approved contracts of training. It may also be used to augment formally acquired competencies.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Instruments</p>						

**ELEMENT**

**PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to select equipment	<p>1.1 The extent and nature of the control system is determined from job specifications.</p> <p>1.2 Safety and other regulatory requirements to which the control system shall comply are identified, obtained and understood</p> <p>1.3 Control apparatus and interconnecting components need for the control system and how they are arranged is determined from job specifications and knowledge of process control systems.</p>
2 Select control apparatus	<p>2.1 Manufacturer's specifications and limitations of appropriate control apparatus is sought and comparisons made with process parameters and control requirements.</p> <p>2.2 Control apparatus is selected on compatibility with process parameters and control requirements and environmental conditions.</p> <p>2.3 Evidence of specified apparatus IP rating is sought from manufacturer where necessary.</p> <p>2.4 Control valves are selected based on percentage travel, flow and loop-and-process characteristics, optimum size, range ability, ability to cope with process pressures and environmental considerations.</p>
3 Select interconnecting cabling and tubing/piping	<p>3.1 Types of control cabling and their configuration are selected to meet environmental conditions and interconnection requirements.</p> <p>3.2 Tubing/piping and accessories are sized to meet capacity and pressure requirements</p> <p>3.3 Route lengths of cable and tubing/piping are determined from site drawings.</p>
4 Document process control system	<p>4.1 Reasons for selections made, including calculations, are documented in accordance with established procedures.</p> <p>4.2 Process control system arrange and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and selecting equipment for process control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.5.10 Technical manuals and catalogues
- 2.5.14 Technical standards, regulations and codes applicable to instrumentation and control
- 2.5.15 Measurement standards applicable to process instrumentation
- 2.12.12 Distributive control principles
- 2.12.13 Instrumentation and control communications
- 2.12.14 Indicators and methods of recording process data
- 2.12.20.1 Process equipment installation requirements and techniques
- 2.12.20.2 Process control arrangements and equipment selection
- 2.18.1 Occupational Health and Safety principles
- 2.18.7 Instrumentation safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to selecting equipment for two process control systems each with more than one input and more than one final control element.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Select equipment for process control systems as listed as described in 7) and including:
    - A Arranging control system to comply with safety and other regulatory requirements and process functions
    - B Selecting compliant and compatible apparatus
    - C Selecting appropriate control cabling and tubing/piping
    - D Documenting control system arrangement, specification for items selected and reasons for the selections made
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and 8.3)**

**specific resources for assessment**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in selecting equipment for process control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEE001A            Use basic computer applications relevant to a workplace

The critical aspects of occupational health and safety covered in UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  NA	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.2; 3.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEE001A Use basic computer applications'

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3

## UEENEEI014A Find and rectify faults in process control systems

### Unit Descriptor

1)

This unit covers finding and rectifying faults in process control apparatus and systems. The unit encompasses safe working practices, interpreting process and circuit diagrams, applying knowledge of process controls to logical fault finding procedures, conducting repairs, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI009A Set up process measuring instruments

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also be used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to find and rectify faults.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Sources of materials that may be required for the work are established in accordance with established procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety</p>
2 Find faults.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures</p> <p>2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures</p> <p>2.4 Fault finding is approached methodically drawing on knowledge of industrial processes and control apparatus and systems using measured and calculated values of system parameters.</p>

- 2.5 Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage
- 2.6 Faulty components are rechecked and their fault status confirmed.
- 2.7 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.8 Fault finding activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
- 3 Rectify fault.
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures
  - 3.3 Materials required to rectify faults are sourced and obtained in accordance with established procedures.
  - 3.4 Repairs are affected efficiently without damage to other components or apparatus and using sustainable energy principles.
  - 3.5 Effectiveness of the repair is tested in accordance with established procedures.
  - 3.6 Apparatus is reassembled, finally tested and prepared for return to customer.
- 4 Completion and report fault finding and rectification activities
  - 4.1 OHS work completion risk control measures and procedures are followed.
  - 4.2 Work area is cleaned and made safe in accordance with established procedures.
  - 4.3 Written justification is made for repairs to apparatus.
  - 4.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and rectifying faults in process control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.3	Fault finding techniques
2.3.3	Process control principles
2.12.6	Process control systems
2.18.1	Occupational Health and Safety principles
2.18.7	Instrumentation safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to finding and rectifying faults in two different systems containing more than one control loop.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access

to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies & workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and rectify faults in process control systems as listed as described in 7) and including:

- A Using methodical fault finding techniques
- B Finding faults efficiently
- C Rectifying faults without damage
- D Providing written justification for the rectifications undertaken
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and rectifying faults in process control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to1 .6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.5; 4.3

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEI015A Find and rectify faults in medical equipment control systems

### Unit Descriptor

1)

This unit covers finding and rectifying faults in medical equipment systems. The unit encompasses safe working practices, interpreting process and circuit diagrams, applying knowledge of medical process controls to logical fault finding procedures, effective repairs, safety and functional testing and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the core competencies in electronics or instrumentation at AQF level 3 have been acquired.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also be used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

#### Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and

site rehabilitation.  
 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and rectify faults

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety

2 Find faults

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Fault finding is approached methodically drawing on knowledge of medical equipment control systems using measured and calculated values of system parameters.

- |   |  |  |
|---|--|--|
|   | 2.5  | Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage  |
|   | 2.6  | Faulty components are rechecked and their fault status confirmed.  |
|   | 2.7  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   | 2.8  | Fault finding activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles. |
| 3 | Rectify fault.   |  |
|   | 3.1  | OHS risk control measures and procedures for carrying out the work are followed.   |
|   | 3.2  | Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures  |
|   | 3.3  | Materials required to rectify faults are sourced and obtained in accordance with established procedures.   |
|   | 3.4  | Repairs are affected efficiently without damage to other components or apparatus and using sustainable energy principles.  |
|   | 3.5  | Effectiveness of the repair is tested in accordance with established procedures.   |
|   | 3.6  | Apparatus is reassembled, finally tested and prepared for return to customer.  |
| 4 | Completion and report fault finding and rectification activities |  |
|   | 4.1  | OHS work completion risk control measures and procedures are followed.   |
|   | 4.2  | Work area is cleaned and made safe in accordance with established procedures.  |
|   | 4.3  | Written justification is made for repairs to apparatus.  |
|   | 4.4  | Work completion is documented and appropriate person(s) notified in accordance with established procedures   |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and rectifying faults in medical equipment control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.12.22.1 Medical equipment principles
- 2.12.22.2 Medical equipment, anatomy and physiology and infection control
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.7 Instrumentation safe working practices
- 2.18.10 Medical equipment safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to finding and rectifying faults in one item of equipment representative of each of the following categories:

- Cardiovascular systems
- Respiratory systems
- Neurological systems
- Renal systems
- Medical imaging
- Physiological equipment
- Miscellaneous medical equipment

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and rectify faults in medical equipment control systems as listed as described in 7) and including:
    - A Using methodical fault finding techniques
    - B Finding faults efficiently
    - C Rectifying faults without damage
    - D Providing written justification for the rectifications undertaken
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and  
specific  
resources for**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This

**assessment**

should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and rectifying faults in medical equipment control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.6; 3.5; 4.3
4	Interacting and understanding of	Refer to the following Performance Criteria for examples of application:

	the context of the work task	1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEI017A Calibrate and test measuring instruments

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers calibration, adjustment and testing of measuring instruments. It encompasses working safely and to standards, following calibration and adjustment procedures, applying knowledge of parameters to be measured, testing and reporting.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed only after the core competencies in electronics or instrumentation at AQF level 3 have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p> <p>Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.</li> </ol>						

**Competency Field 4)**

Instruments

**ELEMENT****PERFORMANCE CRITERIA**

<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to calibrate and test measuring instruments	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site</p> <p>1.5 Instrument parameters are determined by reviewing process specification and equipment manuals.</p> <p>1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety</p>
2 Calibrate and test measuring instruments	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Calibration testing/measuring arrangement is connected and set up in accordance with manufacture's instructions and certification requirements for a particular instrument.</p> <p>2.3 Factors effecting instrument error are determined and taken into account in the calibration process.</p> <p>2.4 Instrument set-point is established and error adjustments are in accordance with manufacture's and compliance specification</p> <p>2.5 Instrument is tested and adjustment made as necessary to ensure instrument meets calibration requirements.</p>

- |   |  |  |
|---|--|--|
|   | 2.6  | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.  |
|   | 2.7  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   | 2.8  | Ongoing checks of the quality of process output are undertaken to ensure control loop is tuned as required.  |
|   | 2.9  | Calibration is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles. |
| 3 | Completion and report calibration activities | 3.1 OHS risk control work completion measures and procedures are followed.   |
|   |  | 3.2 Work site is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3 Calibration is documented in accordance with certification requirements.   |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and calibrating and testing measuring instruments. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |  |
|---------|--|
| 2.5.16  | Measurement standards applicable to scientific instrumentation |
| 2.9.14  | Fundamentals of calibration                                    |
| 2.12.24 | Calibration techniques   |
| 2.18.1  | Occupational Health and Safety principles                      |
| 2.18.7  | Instrumentation safe working practices                         |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to calibrating and test measuring one electrical/electronic and one non-electrical instrument. The calibrated instruments measure accurately within the prescribe tolerance.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Calibrate and test measuring instruments as listed as described in 7) and including:
    - A Identifying instrument parameters
    - B Setting up calibration arrangement in accordance with manufacture’s instructions and certification requirements for a particular instrument.
    - C Determining factors effecting error
    - D Calibrating instrument to measure within specified tolerance
    - E Documenting calibration with certification requirements
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment****8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in calibrating and testing measuring instruments.

**Method of assessment****8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 3.3	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.5; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.7
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	2.4; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.4; 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEI019A Set up field control devices

### Unit Descriptor

1)

This unit covers setting up field control devices such as transducers, sensors, and actuators. It encompasses working safely, following design brief, applying knowledge of device operating principles, interpreting device specifications, following manufacturer's set up specifications, testing device operation and documenting set up parameters.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE007A Use drawings, schedules and service manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to set up field control devices

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The field devices to be set up are determined from control system specifications and in consultations with relevant persons
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Set up field control devices

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Devices are set up drawing on knowledge of field device and operation, characteristics and applications.
- 2.3 Devices are positioned and adjusted in accordance with their operating principles, manufacturer instructions and control system requirements.
- 2.4 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.

- |   |   |   |
|---|---|---|
|   | 2.5   | Setting up devices is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Test and document set up of field control devices | 3.1 OHS risk control measures and procedures for carrying out the work are followed.  |
|   |   | 3.2 Field devices are tested and final adjustments made to correct any anomalies in their operation.  |
|   |   | 3.3 Field device set up is documented in accordance with established procedures.  |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and setting up field control devices. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |         |  |
|--|---------|--|
|  | 2.1.4   | Basic cable and conductor terminations   |
|  | 2.3.4   | Pneumatic/hydraulic control tubing/piping  |
|  | 2.5.14  | Technical standards, regulations and codes applicable to instrumentation and control |
|  | 2.12.23 | Transducers and sensing devices  |
|  | 2.18.1  | Occupational Health and Safety principles  |
|  | 2.18.7  | Instrumentation safe working practices   |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to setting up at least four different field control devices.

Note.

Examples are field control devices measurement/detection of flow, temperature, pressure, density, weight, level, smoke, motion.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up field control devices as listed as described in 7) and including:
    - A Determining the field control devices to be set up
    - B Positioning and adjusting devices accordance with their operating principles, manufacturer instructions and control system requirements
    - C Testing field devices and making final adjustments to correct any anomalies in their operation
    - D Documenting field control device set up in accordance established procedures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up field control devices.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.2	3

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.3 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4

## UEENEEI020A **Provide solutions to problems in basic industrial control systems**

### Unit Descriptor

1)

This unit covers solving problems in basic industrial control systems. The unit encompasses safe working practices, interpreting process and circuit diagrams, applying knowledge of industry controls to problem solving techniques, safety and functional testing and completing the necessary documentation.

Note.

Typical basic industrial control system problems are those encountered in meeting performance requirements and compliance standards, revising control operating parameters and dealing with control malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies to this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to provide solutions to basic industrial control system problems

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of basic industrial control system problems are determined from performance specifications and situation reports and in consultations with relevant persons.
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Provide solutions to basic industrial control system problems

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of basic industrial control system device and circuit operation, characteristics and applications are applied to developing solutions to control problems.
- 2.3 Parameters, specifications and performance requirements in relation to each basic industrial control system problems are obtained in accordance with established procedures.
- 2.4 Approaches to resolving basic industrial control system problems are evaluated to provide most effective solutions.

- |   |   |   |
|---|---|---|
|   | 2.5   | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|   | 2.6   | Problems are solved efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Test and document solutions to basic industrial control system problems |   |
|   | 3.1   | OHS risk control measures and procedures for carrying out the work are followed.  |
|   | 3.2   | Solutions to basic industrial control system problems are tested to determine their effectiveness and modified where necessary.                                       |
|   | 3.3   | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed. (See Note)                     |
|   | 3.4   | Justification for solutions used to solve basic industrial control system problems are documented in accordance with established procedures.                          |

Note:

A licence to practise in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions to problems in basic industrial control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.12.6 Process control systems

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to providing solutions to at least four basic industrial control system problems.

Note.

Examples are field control devices measurement/detection of flow, temperature, pressure, density, weight, level, smoke, motion.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide solutions to problems in basic industrial control systems as described in 7) and including:
    - A Understanding the extent of the basic industrial control system problem
    - B Obtaining electronic device and circuit parameters, specifications and performance requirements appropriate to each problem.
    - C Testing and solutions to basic industrial control system problems
    - D Documenting justification of solutions implemented in accordance established procedures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Note:**

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing solutions to problems in basic industrial control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	3
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.2	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	1.3 to 1.5; 3.2 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEI021A Find and repair faults in measuring and analysis systems

### Unit Descriptor

1)

This unit covers finding and repairing faults in measuring and analysis systems. It encompasses working safely, reading circuit diagrams and device specifications, applying logical fault finding procedures, conducting repairs and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI012A      Verify compliance and functionality of process control installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also be used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States and Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and repair faults

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Fault finding is approached methodically drawing on knowledge of measuring and analytical equipment and circuit using measured and calculated values of apparatus parameters.
  - 2.5 Equipment components are dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.6 Faulty components are rechecked and their fault status confirmed.
  - 2.7 Faulty components are readjusted or replaced in accordance with established procedures.
  - 2.8 Effectiveness of the repaired component is tested in accordance with established procedures.
  - 2.9 Apparatus is reassembled, finally tested and prepared for return to customer.
  - 2.10 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.11 Fault finding and repair activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault finding and repair activities
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work area is cleaned and made safe in accordance with established procedures.
  - 3.3 Written justification is made for repairs to apparatus, including components and materials used.
  - 3.4 Acceptance that the reported fault(s) have been repaired is sought from an appropriate person in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing faults in measuring and analysis systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.9.13 Measurement circuits and applications

- 2.12.15 Gas analysis
- 2.12.16 Water analysis
- 2.12.17 Scientific analysis
- 2.12.18 Weight measurement principles
- 2.18.1 Occupational Health and Safety principles
- 2.18.7 Instrumentation safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to finding and repairing at least four faults in two different types of measuring and analytical equipment.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair faults in measuring and analysis systems as described in 7) and including:
    - A Using methodical fault finding techniques
    - B Finding faults efficiently

- C Replacing components without damage
- D Providing written justification for the repairs
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing faults in measuring and analysis systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH011A	Find and repair faults in the power supplies of electronic apparatus
UEENEEH012A	Find and repair faults in the digital components in electronic apparatus

UEENEEH013A Find and repair faults in the amplifier sections of electronic apparatus

UEENEEH015A Find and repair faults in the microprocessor components of electronic apparatus

The critical aspects of occupational health and safety covered in UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.8	2
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.10

## UEENEEI022A Assist in commissioning process control systems

### Unit Descriptor

1)

This unit covers commissioning of process control systems. It encompasses working safely and with others, complying with requirements, applying knowledge of process and control components, pre-commissioning tests, following start up procedures, checking and adjusting components and controls to ensure efficient and safe operation and completing commissioning documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI012A      Verify compliance and functionality of process control installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to assist in commissioning process control systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Commissioning plan is review with other team members to ensure commissioning procedures and the role of each member is understood and to ensure the work is coordinated effectively.
- 1.5 Measurement parameters are identified with the team by reviewing process requirements and equipment manufacturer instructions.
- 1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety
- 1.7 Preparatory work is checked to ensure no damage has occurred and that work complies with requirements
- 1.8 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 1.9 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures

- |   |   |     |   |
|---|---|-----|---|
| 2 | Assist in commissioning process control systems | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |   | 2.2 | Commissioning testing/measuring devices are connected and set up in accordance with requirements for a particular control system and team instructions.                                 |
|   |   | 2.3 | Process instruments and apparatus are set up and adjusted in accordance with process control requirements and equipment manufacturer instructions and team instructions.                |
|   |   | 2.4 | Adjustments are made to provide optimum transmission/reception performance within regulatory requirements.  |
|   |   | 2.5 | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and from job specifications   |
|   |   | 2.6 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|   |   | 2.7 | Commissioning assistance is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles. |
| 3 | Completion and report commissioning activities  | 3.1 | OHS risk control work completion measures and procedures are followed.  |
|   |   | 3.2 | Work site is cleaned and made safe in accordance with established procedures.   |
|   |   | 3.3 | Adjustment settings are documented and appropriate person(s) notified in accordance with established procedures   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and assisting in commissioning process control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.12.11.2 Process control, commissioning

2.18.1 Occupational Health and Safety principles

## 2.18.7 Instrumentation safe working practices

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to process control systems incorporating closed loop control and digital and analogue elements and with at least five interacting control functions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment****8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points

are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assist in commissioning process control systems as described in 7) and including:
    - A Understanding the role of each commission team member
    - B Connecting and setting-up commissioning testing/measuring devices in accordance with requirements for a particular control system and team instructions
    - C Setting-up and adjusting process instruments and apparatus in accordance with process control requirements and equipment manufacturer instructions and team instructions.

- D Documenting adjustment settings in accordance with established procedures.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assisting in commissioning process control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed

in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3; 2.4; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## UEENEEI023A Design electronic control systems

### Unit Descriptor

1)

This unit covers designing electronic control systems incorporating closed loop and digital and analogue elements. It encompasses working safely, following design brief, applying knowledge of digital and analogue devices, interpreting device specifications, constructing prototypes, using appropriate development software, applying programming techniques, testing developed system prototype operation and documenting design and development work.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH012A Solve problems in digital components of electronic apparatus

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Instruments

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<b>5)</b> Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to design electronic control systems	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the proposed electronic control system is determined from the design brief or in consultations with appropriate person(s)</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site</p> <p>1.5 Materials and devices/components required for the work are determined on compatibility of their specifications with control system requirements and project budget constraints.</p>
2 Design electronic control systems	<p>2.1 OHS risk control work measures and procedures are followed.</p> <p>2.2 Knowledge of digital and analogue elements used in control systems and compliance standards are applied to the design</p> <p>2.3 Alternative arrangements for the design are considered based on the requirements outlined in the design brief.</p> <p>2.4 Safety, functional and budget considerations are incorporated in the design.</p> <p>2.5 Prototype devices and circuits are constructed, programmed and tested for compliance with the design brief and regulatory requirements.</p> <p>2.6 Prototype malfunctions are rectified and retested to ensure effective operation of design.</p> <p>2.7 Control system design is documented for submission to appropriate person(s) for approval</p>

	2.8	Solutions to unplanned situation are provided consistent with organisation policy.
3 Obtain approval for electronic control systems design	3.1	Control system design is presented and explained to client representative and/or other relevant person(s).
	3.2	Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation policy.
	3.3	Final design is documented and approval obtained from appropriate person(s).
	3.4	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing electronic control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.3.21 Complex control systems

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to an electronic control system incorporating closed loop control and digital and analogue elements and with at least five interacting control functions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified

- in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Design electronic control systems as described in 7) and including:
      - A Developing outlines of alternative designs,
      - B Developing the design within the safety and functional requirements and budget limitations,
      - C Documenting and presenting design effectively,
      - D Successfully negotiating design alteration requests
      - E Obtaining approval for final design
      - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show

demonstrated competency in designing electronic control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.3; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	3

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2; 2.3; 2.5; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.6	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 2.3; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.7; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## UEENEEI025A Provide solutions to fluid circuit operations

### Unit Descriptor

1)

This unit covers the solution to problems associated with the operation of fluid controlled circuits. It encompasses working safely, problem solving procedures, including using measuring instruments, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed..

UEENEEE001A Apply OHS practices in the workplace

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE007A Use drawings, diagrams, schedules and service manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher. It may also be suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of fluid operated automated machinery.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to provide solutions to fluid circuit problems

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Provide solutions to fluid circuit problems

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure active circuits is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Established methods are used for solving circuit problems from measure and calculated values, as they apply to fluid circuits.
- 2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.

	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices with the minimum waste and rework
3	Complete work and document solutions to discovered problem	3.1 OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions to fluid circuit operations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.21.13 Fluid power control

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to fluid power circuits as they apply to problems related to engineering diagnosis and development work functions in any 2 of the following types of circuit problems:

- determining the operating parameters of an existing circuit
- alternating an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters

In relation to either types of the following pumps and their associated control equipment:

- hydraulic

- pneumatic

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide solutions to fluid circuit operations as described in 7) and including:
    - A Determining the operating parameters of existing circuit
    - B Using established problem solving methods
    - C Taking relevant measurements accurately
    - D Interpreting measured values appropriately
    - E Providing effective solutions to circuit problems from measurements and calculations
    - F Giving written justification of solutions provided
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and  
specific  
resources for**
**8.3)**

This unit must be assessed as it relates to normal work practice using

**assessment** procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing solutions to fluid circuit operations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	3

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	3

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEI026A Provide solutions to pneumatic/hydraulic system operations

### Unit Descriptor

1)

This unit covers the set-up and maintenance of pneumatic and hydraulic systems. It encompasses working safely, problem solving procedures, including using measuring instruments, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI025A Provide solutions to fluid circuit operations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher. It may also be suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of pneumatic and hydraulic operated automated machinery

### Competency Field

4)

Instruments

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to provide solutions to pneumatic/hydraulic system operations	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 OHS risk control work preparation measures and procedures are followed.</p> <p>1.3 The nature of the system problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Sources of materials that may be required for the work are established in accordance with established procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety</p>
2 Provide solutions to pneumatic/hydraulic system operations	<p>2.1 OHS risk control work measures and procedures are followed.</p> <p>2.2 The need to test or measure active systems is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures</p> <p>2.3 Systems are checked as being isolated where necessary in strict accordance OHS requirements and procedures</p> <p>2.4 Established methods are used for solving system problems from measure and calculated values, as they apply to pneumatic/hydraulic circuits.</p> <p>2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.</p> <p>2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices with the minimum waste and rework.</p>

- |   |  |     |   |
|---|--|-----|---|
| 3 | Complete work and document solutions to discovered problem | 3.1 | OHS work completion risk control measures and procedures are followed.                                      |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.                               |
|   |  | 3.3 | Justification for solutions used to solve system problems is documented.                                    |
|   |  | 3.4 | Work completion is documented and appropriate person(s) notified in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions to pneumatic/hydraulic system operations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.18.1  | Occupational health and safety principles |
| 2.21.11 | Pneumatics                                |
| 2.21.12 | Hydraulics                                |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to pneumatic/hydraulic power systems as they apply to problems related to engineering diagnosis and development work functions in any of the following:

- determining the operating parameters of an existing system
- alternating an existing system to comply with specified operating parameters
- developing systems to comply with a specified function and operating

In relation to both types of the following systems:

- Pneumatics – any two of the following main components:
  - Cooler
  - Dryer
  - Filter
  - Receiver

Control devices – any two of the following components:

- Linear actuator
  - Rotary actuator
  - Directional control valve
  - Timer
  - Counter
- Hydraulics – any two of the following main components:
    - Two cylinder sequenced system
    - Single cylinder skip-check system

Control devices – any two of the following components:

- Rotary actuators
- Linear actuators
- Directional control valve
- Rotary control valve
- Pressure control valve

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide solutions to pneumatic/hydraulic system operations as described in 7) and including:
    - A Determining the operating parameters of existing systems

- B Using established problem solving methods
- C Taking relevant measurements accurately
- D Interpreting measured values appropriately
- E Providing effective solutions to system problems from measurements and calculations
- F Giving written justification of solutions provided
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing solutions to pneumatic/hydraulic system operations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed

in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	3

### **Skills Enabling Employment**

#### **8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEI027A Analyse complex electronic circuits controlling fluids

### Unit Descriptor

1)

This unit covers the analysis of complex electronic control circuits that integrate with the operation of fluid control systems on machinery. It encompasses working safely, applying extensive knowledge of equipment and electronic and fluid control circuit operations, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical problems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed..

UEENEEI025A Provide solutions to fluid circuit operations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to analyse complex circuits controlling fluids.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the circuit analysis is determined from performance specifications and situation reports and in consultations with relevant persons
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.

2 Analyse complex circuits controlling fluids

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of complex control concepts and electro-fluid control circuits are applied to developing analytical solutions to machine parameters.
- 2.3 Parameters, specifications and performance requirements in relation to each circuit are obtained in accordance with established procedures.
- 2.4 Approaches to analysing circuit parameters are carried out to provide the most effective solution.
- 2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.
- 2.6 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards

- |   |   |     |  |
|---|---|-----|--|
| 3 | Document and report on the results of the circuit analysis and actions taken. | 3.1 | Solutions to circuit analysis are tested to determine their effectiveness and modified where necessary.  |
|   |   | 3.2 | Analysis is documented including details of all findings, calculations and assumptions.  |
|   |   | 3.3 | Analysis is reported to appropriate personnel to establish suitable action to be taken based on findings.  |
|   |   | 3.4 | Justification for findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with professional standards. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and analysing complex electronic circuits controlling fluids. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.18.1 Occupational health and safety principles

2.21.7 Electronic control of fluid processes

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to analysing complex circuits controlling integrated electro-fluid systems on at least 2 types of machine:

Note.

Typical circuits are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Analyse complex electronic circuits controlling fluids as described in 7) and including:
    - A Understanding the operation of electronic and fluid controls
    - B Forming effective strategies for analysing circuit performance
    - C Obtaining circuit control parameters, specifications and performance requirements appropriate to each situation.
    - D Testing the results of the analysis
    - E Documenting instruction for implementing any actions resulting from the analysis that incorporates risk control measure to be followed.

- F Documenting justification of actions to be implemented in accordance with professional standards
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in analysing complex electronic circuits controlling fluids.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEI026A      Set up pneumatic/hydraulic systems

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed

in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEI028A Set up controls on complex fluid systems

### Unit Descriptor

1)

This unit covers the setting up, adjustment, maintenance and modification of electronically controlled complex systems that are integrated with hydraulic devices. It encompasses working safely, applying extensive knowledge of complex circuits designed to operate fluid systems and the integration to hydraulics, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note:

Typical problems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI025A Design and configure human-machine interface networks

UEENEEI034A Configure and maintain industrial control system networks

UEENEEI052A Design embedded controller systems

UEENEEI019A Set up field control devices

UEENEEI027A Analyse complex electronic circuits controlling fluids

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to set up controls on complex fluid systems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the work to be undertaken is determined from performance specifications and situation reports and in consultations with relevant persons
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Effective strategies are determined to ensure solution development and implementation is carried out efficiently. **?? unclear**

2 Set up controls on complex fluid systems

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of complex controls and integrated fluid systems are applied to developing analytical solutions to machine parameters and operation.
- 2.3 Parameters, specifications and performance requirements in relation to each control circuit and fluid device are obtained in accordance with established procedures.
- 2.4 Approaches to setting up, maintenance and/or modification are carried out to provide the most effective solution(s).

- |   |   |  |
|---|---|--|
|   | 2.5   | Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.  |
|   | 2.6   | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards  |
| 3 | Document and report on the results of the set up and actions taken. | 3.1 Solutions to set up, maintenance activity and/or modification are tested to determine their effectiveness and modified where necessary.  |
|   | 3.2   | Set-up, maintenance activity and/or modification is documented including details of all findings, calculations and assumptions.  |
|   | 3.3   | Set-up, maintenance activity and/or modification is reported to appropriate personnel to establish suitable action to be taken based on findings.  |
|   | 3.4   | Justification for findings and any actions to be undertaken in relation to the work activity is documented for inclusion in work/project or development records in accordance with professional standards. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and setting up controls on complex fluid systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.18.1 Occupational health and safety principles

2.21.5 Advanced fluid mechanics

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to setting up electronically controlled fluid operated complex systems on at least 2 types of machines.

Note.

Typical circuits are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate competency in this unit

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated

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within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up controls on complex fluid systems as described in 7) and including:
    - A Understanding the operation of electronic and hydraulic controls
    - B Forming effective strategies for analysing circuit and hydraulic performance
    - C Obtaining circuit control and hydraulic parameters, specifications and performance requirements appropriate to each situation.
    - D Testing the results of the analysis
    - E Documenting instruction for implementing any actions resulting from the analysis that incorporates risk control measure to be followed.
    - F Documenting justification of actions to be implemented in accordance with professional standards
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up controls on complex fluid systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.2 to 3.4	3
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEI029A Set up electronically controlled mechanically operated complex systems

### Unit Descriptor

1)

This unit covers the setting up, adjustment, maintenance and modification to electronically controlled mechanically operated complex systems. It encompasses working safely, applying extensive knowledge of electronic circuits and the integration to mechanically operated equipment and systems, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note:

Typical problems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEI025A	Design and configure human-machine interface networks
UEENEEI034A	Configure and maintain industrial control system networks
UEENEEI052A	Design embedded controller systems
UEENEEI019A	Set up field control devices
UEENEEI025A	Provide solutions to fluid circuit operations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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**Application of the Unit 3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to set up electronically controlled mechanically operated complex systems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work
- 1.3 The extent of the work to be undertaken is determined from performance specifications and situation reports and in consultations with relevant persons
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work
- 1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently

2 Set up electronically controlled mechanically operated complex systems

- 2.1 OHS risk control measures and procedures for carrying out the work are followed

- |   |   |   |
|---|---|---|
|   | 2.2   | Knowledge of complex controls and integrated mechanical systems are applied to developing analytical solutions to machine parameters and operation  |
|   | 2.3   | Parameters, specifications and performance requirements in relation to each circuit and mechanical device are obtained in accordance with established procedures  |
|   | 2.4   | Approaches to setting up, maintenance and/or modification are carried out to provide the most effective solution  |
|   | 2.5   | Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy  |
|   | 2.6   | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards   |
| 3 | Document and report on the results of the set up and actions taken. | 3.1 Solutions to set up, maintenance activity and/or modification are tested to determine their effectiveness and modified where necessary  |
|   |   | 3.2 Set up, maintenance activity and/or modification is documented including details of all findings, calculations and assumptions  |
|   |   | 3.3 Set up, maintenance activity and/or modification is reported to appropriate personnel to establish suitable action to be taken based on findings  |
|   |   | 3.4 Justification for findings and any actions to be undertaken in relation to the work activity is documented for inclusion in work/project or development records in accordance with professional standards |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and setting up electronically controlled mechanically operated complex systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |  |
|--------|--|
| 2.18.1 | Occupational health and safety principles    |
| 2.21.6 | Electronic interfacing to mechanical systems |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to setting up electronically controlled mechanically operated complex systems on at least 2 types of machines.

Note.

Typical systems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the

same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up electronically controlled mechanically operated complex systems as described in 7) and including:
    - A Understanding the operation of electronic and mechanical controls
    - B Forming effective strategies for analysing circuit and mechanical performance
    - C Obtaining circuit control and mechanical parameters, specifications and performance requirements appropriate to each situation.
    - D Testing the results of the analysis

- E Documenting instruction for implementing any actions resulting from the analysis that incorporates risk control measure to be followed.
- F Documenting justification of actions to be implemented in accordance with professional standards
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up electronically controlled mechanically operated complex systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEI030A Set up electronically controlled robotic systems

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

# UEENEEI030A Set up electronically controlled robotically operated complex systems

## Unit Descriptor

1)

This unit covers the setting up, adjustment, maintenance and modification to electronically controlled robotically operated complex systems. It encompasses working safely, applying extensive knowledge of electronic circuits and the integration to robotically operated equipment and systems, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note:

Typical circuits are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

## Prerequisite Unit(s)

2)

## Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

- UEENEEI025A Design and configure human-machine interface networks
- UEENEEI034A Configure and maintain industrial control system networks
- UEENEEI052A Design embedded controller systems
- UEENEEI019A Set up field control devices
- UEENEEI025A Provide solutions to fluid circuit operations

## Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

**Application of the Unit 3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Instruments

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to set up electronically controlled robotically operated complex systems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the work to be undertaken is determined from performance specifications and situation reports and in consultations with relevant persons
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.

2 Set up electronically controlled robotically operated complex systems

2.1 OHS risk control measures and procedures for carrying out the work are followed.

- |   |   |  |
|---|---|--|
|   | 2.2   | Knowledge of complex controls and integrated robot systems are applied to developing analytical solutions to machine parameters and operation.   |
|   | 2.3   | Parameters, specifications and performance requirements in relation to each circuit and robot device are obtained in accordance with established procedures.   |
|   | 2.4   | Approaches to setting up, maintenance and/or modification are carried out to provide the most effective solution.  |
|   | 2.5   | Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.  |
|   | 2.6   | Quality of work is monitored against personal performance agreement and/or established organisational or professional standards  |
| 3 | Document and report on the results of the set up and actions taken. | 3.1 Solutions to set up, maintenance activity and/or modification are tested to determine their effectiveness and modified where necessary.  |
|   |   | 3.2 Set up, maintenance activity and/or modification is documented including details of all findings, calculations and assumptions.  |
|   |   | 3.3 Set up, maintenance activity and/or modification is reported to appropriate personnel to establish suitable action to be taken based on findings.  |
|   |   | 3.4 Justification for findings and any actions to be undertaken in relation to the work activity is documented for inclusion in work/project or development records in accordance with professional standards. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and setting up electronically controlled robotically operated complex systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.18.1 | Occupational health and safety principles   |
| 2.21.8 | Electronic interfacing to robotic processes |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to setting up electronically controlled robotically operated complex systems on at least 2 types of machines.

Note.

Typical systems are those encountered in meeting performance requirements and compliance standards, revising a machine operating parameters and dealing with machine malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the

same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Set up electronically controlled robotically operated complex systems as described in 7) and including:
    - A Understanding the operation of electronic and robot controls
    - B Forming effective strategies for analysing circuit and robot performance
    - C Obtaining circuit control and robot parameters, specifications and performance requirements appropriate to each situation.
    - D Testing the results of the analysis

- E Documenting instruction for implementing any actions resulting from the analysis that incorporates risk control measure to be followed.
- F Documenting justification of actions to be implemented in accordance with professional standards.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in setting up electronically controlled robotically operated complex systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEI029A Set up electronically controlled mechanically

operated processes

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEI034A Manage control projects

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the management of control projects involving design, modifications, installation, and/or maintenance of systems and equipment. The unit encompasses covers management of safety, budget variation, personnel, resources, critical path timelines and completion of documentation.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Instruments</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Establish the scope of the project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.3 Project deliverables and budget are established from project planning and other relevant documentation and from discussions with appropriate person(s).</p> <p>1.3 Measurable outcomes are identified to evaluate the project on completion from project planning and other relevant documentation.</p> <p>1.4 Plant, materials and skills needed to meet project outcome are established from project planning and other relevant documentation.</p> <p>1.5 Processes and procedures are developed for managing contract variations from discussions with appropriate person(s) and in accordance with contractual agreement.</p>
2 Manage project.	<p>2.1 OHS policies, procedures and programs are implemented and monitored.</p> <p>2.2 Achievement of project outcomes is delegated to appropriately competent persons involved in the project.</p> <p>2.3 Risk events are identified and project plan strategies implemented to ensure that outcomes are achieved to the required standard of quality specified in the contract and safety required by organisation policy.</p> <p>2.4 Procurement processes and procedures are monitored to ensure on time supply of plant and materials and in accordance with organisation policy.</p> <p>2.5 Project is progress is monitored against schedule, quality requirements and budget.</p> <p>2.6 Conflict issues at the work site and between stakeholders, clients and regulators are identified and managed in accordance with organisation policy.</p>

- |   |                   |   |  |
|---|-------------------|---|--|
|   | 2.7               | Variations are managed in accordance with agreed processes and in accordance with the contract.     |  |
|   | 2.8               | Project records are maintained and progress reports written and forwarded to appropriate person(s). |  |
| 3 | Complete project. | 3.1   | Project outcomes are reviewed against original plan, implemented risk strategies, contract variations, safety record and budget.   |
|   |                   | 3.2   | Project completion acceptance is sought from appropriate person(s) and handover documented in accordance with organisation policy. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and managing control projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.2.17   | Project management  |
| 2.2.19   | Customer/Client relations                                   |
| 2.2.30   | Control industry sector customs and practices               |
| 2.18.1   | Occupational health and safety principles                   |
| 2.18.8.2 | Occupational Health and Safety, enterprise responsibilities |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to managing an industry accepted medium sized control project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Manage control projects as described in 7) and including:
    - A Establishing the scope of the project accurately,
    - B Ascertaining the input a project
    - C Developing effective management processes,
    - D Managing resources and variations effectively
    - E Resolving conflicts
    - F Adopting risk management strategies
    - G Maintaining records and submitting progress reports
    - H Meeting project outcomes

- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in managing control projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.4; 2.6 to 2.8	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3; 2.5; 2.7; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.3; 2.7; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEI035A Plan control projects

### Unit Descriptor

1)

This unit covers development and documentation of control project proposals, milestones and completions. The unit encompasses establishing budgets, critical path analysis, development of workflow strategies, documenting, presenting and negotiating budgets and timelines.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Instruments

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to plan project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established techniques for project planning are reviewed are adopted in accordance with organisation policies.</p> <p>1.3 The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).</p>
2 Develop project plan proposal.	<p>2.1 Estimated plant, material, labour and other costs are sought and obtained from appropriate person(s) in accordance with organisation policies and procedures.</p> <p>2.2 Project budget is established from estimated plant, material, labour and other costs in accordance with organisation policies and procedures.</p> <p>2.3 Knowledge of critical path analysis is applied to developing workflow strategies.</p> <p>2.4 Sources and availability of materials and human resources needed for the project are established in accordance with organisation policies and procedures.</p> <p>2.5 Risk management strategies are sought and obtained for incorporating in the project plan.</p> <p>2.6 Project plan is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>2.7 Project plan proposal is documented in accordance with organisation policies and procedures.</p>
3 Obtain approval for project plan.	<p>3.1 Project plan is presented and discussed with person(s) of higher authority.</p> <p>3.2 Alterations to the project plan resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.</p>

- 3.3 Final project plan is documented and approval obtained from appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and planning control projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.16.1 Project planning
- 2.2.18 Critical path and project analysis
- 2.2.30 Control industry sector customs and practices
- 2.18.1 Occupational health and safety principles
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

- 7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to managing an industry accepted medium sized control project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

- 8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances,

assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies & workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan control projects as described in 7) and including:
    - A Determining the project requirements accurately,
    - B Establishing a project budget
    - C Developing effective work flow strategies,
    - D Documenting project plan proposal
    - E Negotiating alterations to the proposed project plan successfully
    - F Obtaining approval of the final plan
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in planning control projects.

### **Method of assessment**

#### **8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and

incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.6 to 3.2	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 1.6; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.7 to 3.2

## **UEENEEI036A      Manage automated systems projects**

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers the management of automated systems projects involving design, modifications, installation, and/or maintenance of systems and equipment. The unit encompasses management of safety, budget variation, personnel, resources, critical path timelines and completion of documentation.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      3      Writing      3      Numeracy      3
<b>Application of the Unit</b>	<b>3)</b>  This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.
<b>Competency Field</b>	<b>4)</b>  Instruments

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Establish the scope of the project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.3 Project' deliverables and budget are established from project planning and other relevant documentation and from discussions with appropriate person(s).</p> <p>1.3 Measurable outcomes are identified to evaluate the project on completion from project planning and other relevant documentation.</p> <p>1.4 Plant, materials and skills needed to meet project outcome are established from project planning and other relevant documentation.</p> <p>1.5 Processes and procedures are developed for managing contract variations from discussions with appropriate person(s) and in accordance with contractual agreement.</p>
2 Manage project.	<p>2.1 OHS policies, procedures and programs are implemented and monitored.</p> <p>2.2 Achievement of project outcomes is delegated to appropriately competent persons involved in the project.</p> <p>2.3 Risk events are identified and project plan strategies implemented to ensure that outcomes are achieved to the required standard of quality specified in the contract and safety required by organisation policy.</p> <p>2.4 Procurement processes and procedures are monitored to ensure on time supply of plant and materials and in accordance with organisation policy.</p> <p>2.5 Project is progress is monitored against schedule, quality requirements and budget.</p> <p>2.6 Conflict issues at the work site and between stakeholders, clients and regulators are identified and managed in accordance with organisation policy.</p>

- |   |                   |   |   |
|---|-------------------|---|---|
|   | 2.7               | Variations are managed in accordance with agreed processes and in accordance with the contract.         |   |
|   | 2.8               | Project records are maintained and progress reports written and forwarded to all appropriate person(s). |   |
| 3 | Complete project. | 3.1   | Project outcomes are reviewed against original plan, implemented risk strategies, contract variations, safety record and budget.    |
|   |                   | 3.2   | Project completion acceptance is sought from appropriate person(s) and hand-over documented in accordance with organisation policy. |

### **REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and managing automated systems projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |   |
|--|----------|---|
|  | 2.2.17   | Project management  |
|  | 2.2.19   | Customer/Client relations                                   |
|  | 2.2.26   | Automated systems industry sector customers and practices   |
|  | 2.18.1   | Occupational health and safety principles                   |
|  | 2.18.8.2 | Occupational Health and Safety, enterprise responsibilities |

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to managing an industry accepted medium sized automated systems project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this

Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Manage automated systems projects as described in 7) and including:
    - A Establishing the scope of the project accurately,
    - B Ascertaining the input a project
    - C Developing effective management processes,
    - D Managing resources and variations effectively
    - E Resolving conflicts
    - F Adopting risk management strategies
    - G Maintaining records and submitting progress reports
    - H Meeting project outcomes
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in managing automated systems projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.4; 2.6 to 2.8	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	3

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3; 2.5; 2.7; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.3; 2.7; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.8; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6
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## UEENEEI037A Plan automated systems projects

### Unit Descriptor

1)

This unit covers development and documentation of automated systems project proposals, milestones and completions. The unit encompasses establishing budgets, critical path analysis, development of workflow strategies, documenting, presenting and negotiating budgets and timelines.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Instruments

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to plan project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established techniques for project planning are reviewed are adopted in accordance with organisation policies.</p> <p>1.3 The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).</p>
2 Develop project plan proposal.	<p>2.1 Estimated plant, material, labour and other costs are sought and obtained from appropriate person(s) in accordance with organisation policies and procedures.</p> <p>2.2 Project budget is established from estimated plant, material, labour and other costs in accordance with organisation policies and procedures.</p> <p>2.3 Knowledge of critical path analysis is applied to developing workflow strategies.</p> <p>2.4 Sources and availability of materials and human resources needed for the project are established in accordance with organisation policies and procedures.</p> <p>2.5 Risk management strategies are sought and obtained for incorporating in the project plan.</p> <p>2.6 Project plan is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>2.7 Project plan proposal is documented in accordance with organisation policies and procedures.</p>
3 Obtain approval for project plan.	<p>3.1 Project plan is presented and discussed with person(s) of higher authority.</p> <p>3.2 Alterations to the project plan resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.</p>

- 3.3 Final project plan is documented and approval obtained from appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and planning automated systems projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.16.1 Project planning
- 2.2.18 Critical path and project analysis
- 2.2.26 Automated systems industry sector customers and practices
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to managing an industry accepted medium sized automated systems project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances,

assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan automated systems projects as described in 7) and including:
    - A Determining the project requirements accurately,
    - B Establishing a project budget
    - C Developing effective work flow strategies,
    - D Documenting project plan proposal
    - E Negotiating alterations to the proposed project plan successfully
    - F Obtaining approval of the final plan
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in planning automated systems projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and

incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.6 to 3.2	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 1.6; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.7 to 3.2



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 Part 2.1N  
N – Rail Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## UEENEEN001A Service mechanical signalling equipment and infrastructure

<b>Unit Descriptor</b>	1)  This unit covers servicing and cleaning of mechanical signalling and infrastructure. It encompasses safe working, regulatory requirements, following cleaning and servicing work procedures, checking operation and functionality of signalling equipment and infrastructure, and reporting.
<b>Prerequisite Unit(s)</b>	2)
<b>Competencies</b>	2.1)  Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.
<b>Literacy and numeracy skills</b>	2.2)  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      3      Writing      3      Numeracy      3
<b>Application of the Unit</b>	3)  This unit shall apply to qualifications in installation and maintenance of rail signalling.
<b>Licence to practise</b>	3.1)  The skills and knowledge described in this unit may only be practised in the workplace under the codes of practice and regulations of the State/Territory for which the work is carried out. This includes the ‘Code of Practice for the Define Interstate Rail Network’ for work carried out on that network.
<b>Competency Field</b>	4)  Rail

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to clean and service equipment	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.</p> <p>1.4 Cleaning and servicing is appropriately sequenced in accordance with job schedule</p> <p>1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site</p> <p>1.6 Location of equipment to be cleaned and serviced is determined from job specifications and diagrams</p> <p>1.7 Materials needed for cleaning and servicing work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.8 Tools, equipment and testing devices needed to cleaning and servicing work are obtained in accordance with established procedures and checked for correct operation and safety</p>
2 Clean and service equipment	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 All chemicals, lubricants and consumables are used and disposed of in compliance with material safety sheets and OHS codes and practices.</p> <p>2.3 All rubbish, weeds and obstructions are removed from equipment and housings.</p> <p>2.4 Initial visual check of operational equipment is performed to identify any equipment faults.</p> <p>2.5 External services are prepared/painted to organisation standards to protect the equipment.</p>

- 2.6 All internal services and operational components are cleaned and lubricated to ensure operational effectiveness.
- 2.7 Cleaning and servicing is carried out in accordance with relevant standards and requirements and established routines.
- 2.8 Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.
- 2.9 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.10 Cleaning and servicing is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Check equipment operation
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Approval to conduct a check of equipment operation is obtained in accordance with relevant operational rules and procedures.
  - 3.3 Track clearance check is made before conducting equipment operation check to ensure safe train movement.
  - 3.4 Authorised equipment check is carried out in accordance with operating procedures to identify any equipment faults.
  - 3.5 Operational effectiveness of equipment is confirmed through observation during train movements if required.
  - 3.6 Equipments faults are correctly identified, recorded and appropriate corrective action is taken.
  - 3.7 Service equipment is locked and secured to prevent unauthorised access.
  - 3.8 Work completion is documented and appropriate person(s) notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and servicing mechanical signalling equipment and infrastructure. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.5.11	Environmental and heritage awareness
2.14.1	Basic rail operations
2.14.2.2	Rail signalling principles, mechanical
2.14.3	Rail signalling, mechanical equipment
2.14.5	Rail signalling, point actuators devices
2.14.11.2	Rail signalling interlocking systems, mechanical
2.14.13	Rail signalling, electro-pneumatic equipment
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

---

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Service mechanical signalling equipment and infrastructure as described in 7) and including:
    - A Interpreting specifications correctly
    - B Cleaning equipment in accordance with workplace procedures
    - C Using chemicals and tools safely
    - D Testing that equipment is fully functional after cleaning operations
    - E Checking that technical/operational specifications are met and that equipment is in compliance with work orders
    - F Applying effective fault diagnosis techniques,
    - G Ensuring safe trained movement through work area,
    - H Following relevant codes of practice, OHS and environmental protection procedures and requirements, and
    - I Completing relevant records and documentation.

- J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in servicing mechanical signalling equipment and infrastructure.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 3.8	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 2.8	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8; 3.2; 3.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.8; 2.9	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.6; 2.10	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.5; 3.8
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8; 3.2; 3.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8; 2.9

## **UEENEEN002A Assemble and wire internal electrical signalling equipment**

### **Unit Descriptor**

**1)**

This unit covers assembly and wiring internal signalling equipment. It encompasses safe working, regulatory requirements and following work procedures assembling and mounting components, performing internal wiring, terminating cables, and wiring and testing to confirm system integrity.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEG004A Install low voltage electrical apparatus and associated equipment

AND

Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit shall apply to qualifications in installations and maintenance of rail signalling electrical power and control systems.

**Licence to practise 3.1)**

The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes codes of practice, such as ‘Code Of Practice for the defined Interstate Rail Network’ for work carried out on that network.

**Competency Field 4)**

Rail

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to assemble and wire internal signalling equipment

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Technical requirements relating to specific signalling equipment are established.
- 1.5 Assembly and wiring is appropriately sequenced in accordance with job schedule
- 1.6 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.7 Materials needed for assembly and wiring are obtained in accordance with established procedures and checked against job requirements
- 1.8 Tools, equipment and testing devices needed to assemble and wire equipment are obtained in accordance with established procedures and checked for correct operation and safety

2 Assemble signalling equipment

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- 2.2 Equipment is assembled to comply with technical standards and job specifications and requirements.
- 2.3 Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.
- 2.4 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.5 Equipment is assembled efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Wire and connect internal equipment
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Equipment is wired, connected and labelled to comply with technical standards, job specifications and requirements.
  - 3.3 Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.
  - 3.4 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 3.5 Equipment is wired and connected efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 4 Test wiring and terminations
  - 4.1 OHS work completion risk control measures and procedures are followed.
  - 4.2 All terminations are tested in accordance with appropriate testing procedures to ensure tightness and functionality.
  - 4.3 Continuity and insulation tests are carried out as per appropriate test procedures to ensure system standards are met.
  - 4.4 Documentations including wiring diagrams are completed to establish procedures and requirements to ensure quality and safety issues are addressed.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and assembling and wiring internal electrical signalling equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.9.3.2	Inverters
2.14.6	Rail signalling, electronic equipment
2.14.7	Rail signalling, computer-based equipment
2.14.9	Rail signalling, train detection
2.14.10	Rail signalling, remote control systems
2.14.11.1	Rail signalling, interlocking systems, Electrical
2.14.12	Rail signalling, power supplies
2.14.13	Rail signalling, electro-pneumatic equipment
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

---

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble and wire internal electrical signalling equipment as described in 7) and including:
    - A Interpreting specifications correctly
    - B Assembling and wiring equipment to specified/technical workplace requirements
    - C Following correct testing procedures
    - D Ensuring assembled/wired equipment operates to specifications
    - E Using appropriate tools correctly and safely
    - F Following relevant codes of practice, OHS and environmental protection procedures and requirements
    - G Completing relevant records and documentation
    - H Interpreting signalling circuit diagram
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling and wiring internal electrical signalling equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	1.3; 1.6; 2.3; 4.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.4; 1.6 to 1.8	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.7; 1.8; 2.2; 3.2; 4.2; 4.3	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2; 1.4; 4.2; 4.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.2; 3.4

## UEENEEN003A Install and maintain track circuit leads and bonds

### Unit Descriptor

1)

This unit covers insulation of track circuit leads and bonds. It encompasses safe working, regulatory requirements and following work procedures, job planning, running and positioning, connecting track leads and bonds, maintaining and testing track leads and bonds and completing required documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEG017A Install electric power and control equipment for rail network signalling

AND

Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.

### Licence to practise

3.1)

The skills and knowledge described in this unit may only be practised in the w regulations related to electrical work, the codes of practice and regulations of t State/Territory in which the work is carried out. This includes codes of practic ‘Code Of Practice for the Defined Interstate Rail Network’ for work carried ou network.

**Competency Field 4)**

Rail

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to install and maintain track circuit leads and bonds

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Installation and maintenance of track circuit leads and bonds is appropriately sequenced in accordance with job schedule.
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Installation and maintenance instructions are reviewed to obtain clear and concise work requirements.
- 1.7 Site bonding layout plan is reviewed to clarify bonding requirements.
- 1.8 Material needed to install and maintain track circuit leads and bonds is obtained in accordance with established procedures and checked against job requirements
- 1.9 Tools, equipment and testing devices needed to install and maintain track circuit leads and bonds are obtained in accordance with established procedures and checked for correct operation and safety
- 1.10 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements

2 Install track circuit leads and bonds

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.

- |   |  |   |  |
|---|--|---|--|
|   | 2.2                                    | Specified leads of bonds are run and positioned appropriately to the formation conditions and to minimise potential damage from track maintenance machines.   |  |
|   | 2.3                                    | Positions of boxes and cable pits are checked to ensure compliance with specifications and appropriate follow up action is initiated where necessary.   |  |
|   | 2.4                                    | Components and rail services a prepared to ensure secure and sound connections can be made.   |  |
|   | 2.5                                    | Leads or bonds are connected using appropriate fastening techniques and ensuring technical appliance is achieved.   |  |
|   | 2.6                                    | Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.   |  |
|   | 2.7                                    | Unexpected situations are dealt with safely and with the approval of an authorised person.  |  |
|   | 2.8                                    | Track circuit leads and bonds are installed and connected efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |  |
| 3 | Maintain track circuit leads and bonds | 3.1   | OHS risk control work completion measures and procedures are followed.   |
|   |  | 3.2   | Bonds, leads and rail connections are checked for damage or determination and appropriate corrective action is initiated.  |
|   |  | 3.3   | Appropriate tests are completed to identify components requiring repair or replacement.  |
|   |  | 3.4   | Repair or replacement of components is carried out with due regard to train movements and safety of personnel involved.  |
|   |  | 3.5   | Temporary bonding is installed where required and electrical readings on bonds/lead connections and insulated rail joints are taken to ensure compliance with specifications and site bonding layout plan. |
|   |  | 3.6   | Track related equipment is inspected for faults or damage and all faults are documented and appropriate follow up action is initiated.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintaining track circuit leads and bonds. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.5.11	Environmental heritage awareness
2.14.1	Basic rail operations
2.14.9	Rail signalling, train detection
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and maintain track circuit leads and bonds as described in 7) and including:
    - A Interpreting specifications correctly
    - B Installing track circuit track leads and bonds correctly
    - C Applying bonding techniques correctly
    - D Ensuring bonds and leads testing and results comply with technical requirements
    - E Complying with any local fire bands restrictions
    - F Selecting and use tools correctly
    - G Following relevant codes of practice, OHS and environmental procedures and requirements
    - H Interpreting relevant diagrams and track insulation plans
    - I Completing relevant records and documentation
    - J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and maintaining track circuit leads and bonds.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.6	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.7	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7; 3.2 to 3.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.3	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.7 to 1.10
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  3.5; 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.10
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6; 2.7

## UEENEEN004A Perform cable tests

### Unit Descriptor

1)

This unit covers testing of signal and communication cables. It encompasses safe working, regulatory requirements and following work procedures determining the tools required setting up and conducting test, interpreting test results, determining activities to maintain system integrity and reporting activities.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEG005A Verify compliance and functionality of general electrical installation

AND

Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.

### Licence to practise

3.1)

The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.

**Competency Field** 4)

Rail

**ELEMENT****PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to perform cable system testing.

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.
- 1.4 Access times and methods are confirmed to comply with customer requirements and relevant legislation
- 1.5 Service is checked for availability for testing and is isolated/disconnected from use and carriers network/equipment to ensure no equipment damage can occur during testing
- 1.6 Required tests and purpose of tests are identified from site, client documentation and manufacturer specifications
- 1.7 Tools and testing devices needed for cable testing are obtained in accordance with established procedures and checked for correct operation and safety
- 1.8 Testing devices calibration certification is checked and is current to ensure manufacturers specifications are achieved

2 Perform cable tests.

- 2.1 Work area and cable system is made safe for testing and other OHS risk control measures and procedures for carrying out the testing are followed.
- 2.2 Tests are set up and performed in accordance with safety measures and manufacturer specifications.
- 2.3 Test results are read accurately and compared against manufacturers and site specifications for cable performance

- 2.4 Established methods for dealing with unexpected situations are dealt with safely and with the approval of an authorised person
- 2.5 Testing is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 2.6 Available services are connected and tested for functionality to ensure all previous services have been resumed
- 3 Report test results.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Recommendations on actions needed to maintain cable system integrity resulting from cable tests are made and documented
  - 3.3 Results of tests are documented accurately and without delay to ensure test results remain current
  - 3.4 Site and installation files are updated to ensure traceability of information on system performance is maintained

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and performing cable system tests. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.2 Enterprise work activities records
- 2.4.16 Personal computers, engineering applications software basic
- 2.5.4 Technical standards, regulations and codes rail networks
- 2.5.10 Technical manuals and catalogues
- 2.5.11 Environmental heritage awareness
- 2.11.8 Data and voice cabling testing devices
- 2.14.1 Basic rail operations
- 2.14.9 Rail signalling, train detection

- 2.14.12 Rail signalling, power supplies
- 2.14.14 Rail signalling, drawings and diagrams
- 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.5 Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.
- Testing and identifying at least five non-compliant test results.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Perform cable system tests as described in 7) and including:
  - A Interpreting plans and specifications correctly,
  - B Testing cable in accordance with workplace procedures,
  - C Using test equipment and tools correctly and safely,
  - D Confirming the integrity of a cable system,
  - E Checking that technically/operational specifications are met and that cable is in compliance with specification,
  - F Applying effective cable fault diagnosis and repair techniques,
  - G Following relevant codes of practice, procedures and requirements, and
  - H Completing relevant records and documentation
  - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in performing cable system tests.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 2.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.2	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2; 2.3	2
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.8; 2.2; 2.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4

## **UEENEEN005A    Install and maintain signalling power supplies**

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers installation and maintenance of signalling power supplies. It encompasses working safely and to installation/maintenance standards, matching equipment with that specified for a given location, terminating cables and connecting wiring, compliance and functional testing and completing the necessary installation documentation.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading        4        Writing        4        Numeracy        4
<b>Application of the Unit</b>	<b>3)</b>  This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.
<b>Competency Field</b>	<b>4)</b>  Rail

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to install and maintain signalling power supplies.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards which have not previously been identified are noted, and established risk control measures are implemented.</p> <p>1.4 Nature of the work and location of power supply is determined by site inspection and from job instructions, specifications and/or diagrams.</p> <p>1.5 Materials needed for the installation, maintenance/repair work are obtained in accordance with established procedures and checked against job requirements.</p> <p>1.6 Tools, equipment and testing devices needed to install or maintain/repair power supplies are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Install signalling power supplies	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Power supply is installed to comply with technical standards and job specifications and requirements.</p> <p>2.3 Wiring is run and cables terminated to comply with technical standards and job specifications and requirements.</p> <p>2.4 Tests are conducted to ensure installed power supply complies with specifications and functions as intended.</p> <p>2.5 Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.</p> <p>2.6 Installation of power supply is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.</p>

3	Maintain/repair signalling power supplies	3.1	OHS risk control measures and procedures for carrying out the work are followed.
		3.2	Correct functioning of equipment is established from reference to manuals, system specifications and commissioning data.
		3.3	Faults are identified by reference to appropriate technical information and applying knowledge of power supplies to logical fault finding techniques.
		3.4	Faulty, worn, damaged or insecure components are replaced, repaired or secured in accordance with manufacturer specifications and enterprise requirements.
		3.5	Tests are conducted to ensure maintained/repaired power supply complies with specifications and functions as intended.
		3.6	Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.
		3.7	Maintenance and repair of power supply is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
4	Complete installation and maintain of signalling power supplies	4.1	OHS work completion risk control measures and procedures are followed.
		4.2	Work site is cleaned and made safe in accordance with established procedures.
		4.3	Work completion is documented and appropriate person(s) notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintaining signalling power supplies. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.2.2	Enterprise work activities records
2.4.16	Personal computers, engineering applications software basic

2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.9.3.3	Electronic switching
2.9.3.2	Inverters
2.9.11	Linear and switch mode power supplies
2.14.12	Rail signalling, power supplies
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

## **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified

- in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Install and maintain signalling power supplies as described in 7) and including:
      - A Interpreting specifications and circuit diagrams correctly
      - B Maintaining, repairing and installing power supplies correctly
      - C Using appropriate diagnostic and fault finding techniques
      - D Using tools and test instruments correctly
      - E Following relevant codes of practice, procedures and requirements
      - F Completing relevant records and documentation
      - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and maintaining signalling power supplies.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.5	

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 3.1 to 3.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.6
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## UEENEEN006A **Maintain remote control and non-vital interlocking control systems**

### **Unit Descriptor**

1)

This unit covers maintenance and repair of remote and non-vital interlocking control systems on rail networks. It encompasses safe working, regulatory requirements and following work procedures performing scheduled maintenance, finding and repairing faults, testing control and indicating equipment and reporting.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in this unit shall be assessed only after the relevant workplace requirements in 'Work site protection' have been acquired.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the 'Code Of Practice for the Define Interstate Rail Network' for work carried out on that network.

### **Competency Field**

4)

Rail

## **ELEMENT**

## **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to undertake maintenance, fault finding and repair	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of maintenance is determined from maintenance schedules, job specifications, drawings and regulatory requirements</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site</p> <p>1.5 Materials needed for maintenance and repair work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.6 Tools, equipment and testing devices needed to maintenance and repair work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2. Perform scheduled maintenance	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Visual inspection is carried out and all equipment is checked to ensure module insertion security is in accordance with manufacturer and systems specifications.</p> <p>2.3 Action is implemented to ensure the sealing and security of mountings is made to comply with technical/manufacturer specifications.</p> <p>2.4 Maintenance work includes cleaning, vermin control, checking and adjusting levels, checking indicators and system operation is carried out to organisation requirements.</p> <p>2.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p> <p>2.6 Maintenance is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.</p>

3. Find and repair faults	3.1	OHS risk control measures and procedures for carrying out the work are followed.
	3.2	System faults are verified using appropriate technical information, fault finding and diagnostic techniques to identify faulty control equipment.
	3.3	Faulty modules are replaced, adjusted and secured in accordance with manufacturer specifications and organisation procedures.
	3.4	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	3.5	Fault finding and repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
4. Test control and indicating equipment	4.1	OHS risk control measures and procedures for carrying out the work are followed.
	4.2	Control equipment is adjusted and tested using appropriate test procedures and equipment to ensure it operates within the specified technical parameters.
5. Finalise maintenance and repair work	5.1	OHS work completion risk control measures and procedures are followed.
	5.2	System faults identified beyond the scope of first level maintenance are reported for follow-up action.
	5.3	Test results are documented in accordance with organisation requirements and faulty or replaced module(s) are tagged and dispatched to maintain equipment spares.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining remote control and non-vital interlocking control systems and repairing faults. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.2.2	Enterprise work activities records
2.3.13	Using supervisory control and data acquisition systems
2.4.11	Personal computers, hardware basic

2.4.13	Computer peripherals
2.4.16	Personal computers, engineering applications software basic
2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.9.3.2	Inverters
2.9.3.3	Electronic switching
2.9.11	Linear and switch mode power supplies
2.10.1.1	Electronic communications, principles
2.14.6	Rail signalling, electronic equipment
2.14.8	Rail signalling, computer applications
2.14.10	Rail signalling, remote control systems
2.14.12	Rail signalling, power supplies
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain remote control and non-vital interlocking control systems and repair faults as described in 7) and including:
    - A Reading and interpreting specifications correctly,
    - B Maintaining and repairing relay interlocking systems to meet operational and technical standards,
    - C Using effective fault diagnosis and repair/replacement techniques to specified model level,
    - D Confirming equipment operated within specified technical parameters,
    - E Testing equipment and instruments,
    - F Using tools correctly,
    - G Following relevant codes of practice, environmental protection procedures and requirements, and
    - H Completing relevant records and documentation
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining remote control and non-vital interlocking control systems and repairing faults.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	1.4; 5.2; 5.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  3.2	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5; 3.2 to 3.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.6; 3.2; 4.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:

		All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.3; 1.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.2 to 2.4; 3.2; 3.3; 4.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.5; 3.4

## **UEENEEN007A Maintain power signalling and protected level crossing equipment**

### **Unit Descriptor**

**1)**

This unit covers maintenance and repairing faults in power signalling and level crossing equipment on rail networks. It encompasses safe working, regulatory requirements and following work procedures, performing scheduled maintenance findings and repairing faults, performing operational tests and reporting.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit shall be assessed only after the relevant workplace requirements in 'Work site protection' have been acquired.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the 'Code Of Practice for the Define Interstate Rail Network' for work carried out on that network.

### **Competency Field**

**4)**

Rail

## **ELEMENT**

## **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to undertake maintenance, fault finding and repair	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of maintenance is determined from maintenance schedules, job specifications, drawings and regulatory requirements</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others to minimise traffic disruption</p> <p>1.5 Materials needed for maintenance and repair work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.6 Tools, equipment and testing devices needed to maintenance and repair work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2. Perform scheduled maintenance	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The correct functioning of equipment is established from relevant technical manuals and operating instructions to identify accessible operating requirements.</p> <p>2.3 Equipment and components are cleaned, lubricated and adjusted to specified standards.</p> <p>2.4 Equipment/component abnormalities are identified and appropriate remedial action is taken to ensure equipment conforms and performs to technical specifications.</p> <p>2.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p> <p>2.6 Maintenance is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.</p>

- |                               |     |   |
|-------------------------------|-----|---|
| 3. Find and repairs faults    | 3.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|                               | 3.2 | Equipment faults and/or damage to equipment are identified using efficient fault finding and diagnostic techniques, including fault indicators, error codes and maintenance records.        |
|                               | 3.3 | Repair, replacement and/or adjustment are performed using appropriate tools and test equipment to ensure signalling equipment operates to required technical and operational standards.     |
|                               | 3.4 | Faulty, worn, damaged or insecure components are replaced, repaired or secured to conform to manufacturers and workplace requirements.  |
|                               | 3.5 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|                               | 3.6 | Fault finding and repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 4. Perform operational checks | 4.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|                               | 4.2 | Equipment is tested and adjusted using appropriate test equipment and procedures to ensure it operates within the specified technical parameters.   |
|                               | 4.3 | Signal and level crossing lamp alignments are carried out as part of the testing and adjusting procedures where appropriate.  |
| 5. Finalise work and report   | 5.1 | OHS work completion risk control measures and procedures are followed.  |
|                               | 5.2 | Equipment is taken out of service/brought back into use as appropriate, and required documentation is completed to conform to workplace requirements.                                       |
|                               | 5.3 | Documentation required by the organisation is completed to ensure accurate maintenance records are maintained.  |
|                               | 5.4 | Work site/equipment is reinstated to organisation requirements and faulty components are tagged, recorded and despatched for repair/replacement.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining power signalling and protected level crossing equipment and repairing faults. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.2.2	Enterprise work activities records
2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.5.11	Environmental and heritage awareness
2.10.1.1	Electronic communications, principles
2.14.1	Basic rail operations
2.14.3	Rail signalling, mechanical equipment
2.14.4	Rail signalling, electrical equipment
2.14.5	Rail signalling, point actuators devices
2.14.9	Rail signalling, train detection
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain power signalling and protected level crossing equipment and repair faults as described in 7) and including:
    - A Interpreting specifications correctly
    - B Using appropriate fault finding techniques
    - C Maintaining electrically-operated signalling equipment to operational requirements
    - D Organising work to minimise traffic disruptions
    - E Using tools correctly
    - F Following relevant codes of practice, OHS and environmental protection procedures and requirements
    - G Completing relevant records and documentation.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:  
 Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:  
 Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining power signalling and protected level crossing equipment and repairing faults.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:  
 Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	5.2 to 5.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.4; 2.2	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2; 4.2; 4.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.2; 3.3; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.2; 3.3; 4.2; 4.3	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.2 to 4.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.5; 1.6; 2.2 to 2.4; 3.3 to 3.4; 4.2; 4.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.5

## UEENEEN008A Maintain on-site power operated point-activating devices

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers on site maintenance of power point activating devices in rail networks. It encompasses safe working, regulatory requirements and following work procedures performing scheduled maintenance, repairing point activity devices, testing, verifying integrity of the maintenance work and reporting.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Rail</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to undertake maintain and repair work	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of maintenance is determined from maintenance schedules, job specifications, drawings and regulatory requirements</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site</p> <p>1.5 Materials needed for maintenance and repair work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.6 Tools, equipment and testing devices needed to maintenance and repair work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2. Perform schedules maintenance	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Maintenance work including cleaning, brushing and lubricating is carried out on point activating devices to ensure technical and operational specifications are met.</p> <p>2.3 Adjustments to point activating devices are made to ensure correct operation and perway fastenings and timbers are inspected for conformity to specifications.</p> <p>2.4 The position and mounting of point activating devices are checked to ensure conformity to site layout specifications.</p> <p>2.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p>

- |   |     |   |
|---|-----|---|
|   | 2.6 | Maintenance is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.                  |
| 3. Repairs and test point activating device | 3.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|   | 3.2 | The correct function of the equipment is established from appropriate technical data and equipment operating procedures and maintenance handbooks.  |
|   | 3.3 | Faulty, worn, damaged or insecure components are replaced, repaired or secured to conform to technical and manufacturers specifications to ensure operational effectiveness.                |
|   | 3.4 | The equipment is tested using approved testing procedures and equipment to ensure operational and technical requirements are achieved.  |
|   | 3.5 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|   | 3.6 | Fault finding and repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 4. Finalise work and report                 | 4.1 | OHS work completion risk control measures and procedures are followed.  |
|   | 4.2 | Appropriate documentation is accurately completed to provide an accurate maintenance records database and inform train control of work status details.                                      |
|   | 4.3 | Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.   |
|   | 4.4 | Faulty Perway conditions/components are documented to provide details for corrective action.  |
|   | 4.5 | Point activating devices are taken out of service/booked back into use and certified as appropriate to organisation requirements and procedures.  |
|   | 4.6 | Maintenance work activities are recorded as per organisation requirements to provide accurate records.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining on site power operated point-activating devices. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.2.2	Enterprise work activities records
2.3.13	Using supervisory control and data acquisition systems
2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.5.11	Environmental and heritage awareness
2.14.1	Basic rail operations
2.14.3	Rail signalling, mechanical equipment
2.14.4	Rail signalling, electrical equipment
2.14.5	Rail signalling, point actuators devices
2.14.13	Rail signalling, electro-pneumatic equipment
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain on site power operated point-activating devices as described in 7) and including:
    - A Interpreting applications correctly
    - B Maintaining point activating devices to operational requirements
    - C Using appropriate fault finding techniques
    - D Documenting Perway defects accurately
    - E Using tools correctly
    - F Following relevant codes of practice, OHS and environmental protection procedures and requirements
    - G Completing relevant records and documentation
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining on site power operated point-activating devices.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	4.2 to 4.6	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.2 to 4.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.5; 1.6; 2.2 to 2.4; 3.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.5

## UEENEEN009A Maintain track circuit equipment

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers maintenance, fault finding and repair of track circuit equipment in a rail network. It encompasses safe working, regulatory requirements and following work procedures, performing maintenance finding, finding and repairing faults, adjusting and testing to verify operational integrity and reporting.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      4      Writing      4      Numeracy      4
<b>Application of the Unit</b>	<b>3)</b>  This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.
<b>Competency Field</b>	<b>4)</b>  Rail

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to maintain track circuit equipment and repair faults	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of maintenance is determined from maintenance schedules, job specifications, drawings and regulatory requirements</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site</p> <p>1.5 Materials needed for maintenance and repair work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.6 Tools, equipment and testing devices needed to maintenance and repair work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Maintain track circuit equipment and repair faults	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Maintenance is carried out to manufacturer specifications using procedures consistent with delegated authority.</p> <p>2.3 Normal function and operating parameters are confirmed using appropriate manuals, specifications and commissioning data.</p> <p>2.4 Fault finding and diagnostic techniques are completed to verify system/faults.</p> <p>2.5 Faulty, damaged or insecure components are replaced, repaired or secured in accordance with manufacturer specifications and organisation procedures.</p> <p>2.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p>

- |   |     |  |
|---|-----|--|
|   | 2.7 | Maintenance and repair work is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3. Adjust and test track circuits           | 3.1 | OHS risk control measures and procedures for carrying out the work are followed.   |
|   | 3.2 | Appropriate readings are measured and recorded using relevant test instruments.  |
|   | 3.3 | Equipment is tested and adjusted in accordance with the specifications.  |
|   | 3.4 | Equipment operational tests are completed to specifications and procedures.  |
|   | 3.5 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |
|   | 3.6 | Testing and adjusting is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.       |
| 4. Finalise work and record work activities | 4.1 | OHS risk control work completion measures and procedures are followed.   |
|   | 4.2 | Correct calibration of equipment is verified and equipment is confirmed as fulfilling functional tests in accordance with organisation certification procedures.                             |
|   | 4.3 | Work completion is documented and appropriate persons notified in accordance with established procedures   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining track circuit equipment and repairing faults. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.2.2  | Enterprise work activities records                          |
| 2.3.13 | Using supervisory control and data acquisition systems      |
| 2.4.16 | Personal computers, engineering applications software basic |

2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.14.1	Basic rail operations
2.14.9	Rail signalling, train detection
2.14.12	Rail signalling, power supplies
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified

- in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Maintain track circuit equipment and repair faults as described in 7) and including:
      - A Interpreting specifications correctly
      - B Installing, maintaining and testing equipment in accordance with workplace procedures
      - C Using tools and test equipment safely
      - D Checking that technical operational specifications are met and that equipment is in compliance with work orders
      - E Following relevant codes of practice OHS and environmental protection procedures and requirements
      - F Completing relevant records and documentation
      - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

### **Context of and specific resources for assessment**

#### **8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining track circuit equipment and repairing faults.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 3.2, 3.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.3; 3.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.2	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 4.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 1.6; 2.2 to 2.5; 3.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 3.5
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## UEENEEN010A **Maintain electronic signalling and communication equipment**

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers maintain and repair faults electronic signalling and communications systems in a rail network. It encompasses safe working, regulatory requirements and following work procedures diagnosing and rectifying system faults, repairing and replacing faulty equipment, calibrating and testing and report work activities.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Rail</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to repair faults	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The nature and extent of the reported fault is clarified with the system user and review of formal fault report</p> <p>1.4 The normal function of the equipment is established through reference to operating manuals, systems, specifications and commissioning data.</p> <p>1.5 Materials needed to repair the fault are obtained in accordance with system specifications and established procedures.</p> <p>1.6 Tools, equipment and testing devices needed to diagnose the fault are obtained in accordance with established procedures and checked for correct operation and safety.</p> <p>1.7 Symptoms/faults are verified using fault finding and diagnostic techniques and appropriate technical and other information available from fault indicators, error codes and maintenance records.</p>
2 Diagnose faults	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Cause of the fault is determined through consultation with the user, obtaining specialist or engineering advice and reviewing information from fault indicators, error codes and maintenance records.</p> <p>2.3 Faulty equipment is identified and recorded with failure details in accordance with organisation procedures.</p> <p>2.4 Function test using approved test equipment is carried out to determine the location and nature of the fault using the most effective diagnostic/fault finding techniques.</p>

- 2.5 All appropriate components are disconnected to enable accurate test measurements of faulty components.
- 2.6 Circuit diagrams and manufacturer specifications are used to determine the correct operating levels/performance of the equipment
- 2.7 Faults are diagnosed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Rectify faults
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 The fault is isolated and assessed to determine the most appropriate repair method, tools, test and measurement instruments to be used.
  - 3.3 Faulty, worn, damaged or insecure components are replaced, repaired, or secured to manufacturer/technical specifications and the equipment is returned to service.
  - 3.4 Parts/components identified as faulty and within the repair capacity of the service centre are repaired to manufacturer specifications.
  - 3.5 Parts/components requiring repairs beyond the repair capacity of the service centre are dispatched for external repairs or disposed of in accordance with the organisation procedures.
  - 3.6 Parts/components identified as suitable for replacement are replaced from available parts/component resources.
  - 3.7 Faults are rectified efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 4. Calibrate and test repair and replaced equipment
  - 4.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 4.2 Repaired/replaced equipment is tested using approved test equipment in accordance with appropriate test procedures to ensure equipment is fully operational.

- |                                      |     |  |
|--------------------------------------|-----|--|
|                                      | 4.3 | All test equipment used is checked to ensure it is within calibration standards.   |
|                                      | 4.4 | All appropriate adjustments and calibrations are carried out to the specified settings and values.   |
|                                      | 4.5 | Repaired/replaced equipment is calibrated and tested efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 5. Finalise and report fault repairs | 5.1 | OHS work completion risk control measures and procedures are followed.   |
|                                      | 5.2 | Required documentation is completed, including confirmation that equipment has been repaired to manufacturer specifications.   |
|                                      | 5.3 | Arrangements are made for the safe return of equipment to the customer and in accordance with workplace procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining and repairing faults in electronic signalling and communication systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.2.2   | Enterprise work activities records                          |
| 2.3.13  | Using supervisory control and data acquisition systems      |
| 2.4.11  | Personal computers, hardware basic                          |
| 2.4.16  | Personal computers, engineering applications software basic |
| 2.4.13  | Computer peripherals  |
| 2.5.4   | Technical standards, regulations and codes rail networks    |
| 2.5.10  | Technical manuals and catalogues                            |
| 2.9.3.3 | Electronic switching  |
| 2.9.3.2 | Inverters   |
| 2.9.11  | Linear and switch mode power supplies                       |

- 2.10.1.1 Electronic communications, principles
- 2.14.1 Basic rail operations
- 2.14.4 Rail signalling, electrical equipment
- 2.14.6 Rail signalling, electronic equipment
- 2.14.7 Rail signalling, computer-based equipment
- 2.14.8 Rail signalling, computer applications
- 2.14.9 Rail signalling, train detection
- 2.14.10 Rail signalling, remote control systems
- 2.14.11.1 Rail signalling, interlocking systems, electrical
- 2.14.11.2 Rail signalling interlocking systems, mechanical
- 2.14.12 Rail signalling, power supplies
- 2.14.14 Rail signalling, drawings and diagrams
- 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.5 Rail safe working practices

## **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects  
of evidence  
required to  
demonstrate  
competency in  
this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain and repair faults in electronic signalling and communication systems as described in 7) and including:
    - A Interpreting specifications correctly,
    - B Diagnosing equipment faults accurately and efficiently,
    - C Using effective and efficient fault finding techniques,
    - D Using resources efficiently,
    - E Repairing equipment in accordance with workplace procedures,
    - F Ensuring repaired equipment conforms to manufacturers specifications,
    - G Calibrating and using test equipment and tools correctly,

- H Following relevant codes of practice, environmental protection procedures and requirements, and
- I Following correct liaison procedures, and
- J Completing relevant records and documentation
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining and repairing faults in electronic signalling and communication systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 5.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.2; 2.4; 4.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 2.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 4.2 to 4.4	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  5.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.2 to 2.6; 3.2 to 3.5; 4.2 to 4.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.2 to 2.6

## **UEENEEN011A      Install and maintain power operated signalling equipment**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers installation and maintenance of power operated signalling equipment. It encompasses safe working, regulatory requirements and following work procedures, assembling signal control equipment, installing equipment, components, wiring, connecting and checking and testing.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Rail</p>						

### **ELEMENT**

### **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to install and maintain power operated signalling equipment	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.</p> <p>1.4 Appropriate personnel are consulted to ensure the work can proceed without delaying or compromising the operational safety of train movements.</p> <p>1.5 Materials needed for the installation/maintenance work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.6 Tools, equipment and testing devices needed for the installation/maintenance work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Assemble signalling control equipment	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Signal control equipment is checked to confirm technical specifications can be met.</p> <p>2.3 Sub assemblies of signal control equipment are assembled in accordance with work specifications and checked to confirm circuit integrity.</p> <p>2.4 Complete sub assemblies are tested off site where possible to ensure technical operations can be met.</p> <p>2.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p> <p>2.6 Assembly of control equipment is done efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.</p>
3 Install and connect wiring and equipment	<p>3.1 OHS risk control measures and procedures for carrying out the work are followed.</p>

- |   |     |   |
|---|-----|---|
|   | 3.2 | Signal control components and sub assemblies are checked and installed in accordance with job specifications.   |
|   | 3.3 | Component and wiring test are performed to ‘live test’ conditions to ensure control equipment functions correctly.  |
|   | 3.4 | Cables are installed and connected in accordance with job specifications and established procedures.  |
|   | 3.5 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|   | 3.6 | Equipment and wiring is installed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 4. Check and test equipment and components            | 4.1 | OHS risk control measures and procedures for carrying out the work are followed   |
|   | 4.2 | Appropriated operational test procedures are applied to ensure equipment and components are fully operational   |
|   | 4.3 | Control equipment is monitored and tested to ensure it operated within the technical parameters specified.  |
|   | 4.4 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|   | 4.5 | Testing is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.              |
| 5 Complete and document installation/maintenance work | 5.1 | OHS work completion risk control measures and procedures are followed.  |
|   | 5.2 | Work site is made safe in accordance with established safety procedures.  |
|   | 5.3 | Test results and documentation is completed to confirm operational compliance to system requirements and job specifications.  |

- 5.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintaining power operated signalling equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.2 Enterprise work activities records
- 2.3.13 Using supervisory control and data acquisition systems
- 2.5.4 Technical standards, regulations and codes rail networks
- 2.5.10 Technical manuals and catalogues
- 2.5.11 Environmental and heritage awareness
- 2.14.1 Basic rail operations
  - 2.14.2.1 Rail signalling principles, electrical
  - 2.14.3 Rail signalling, mechanical equipment
  - 2.14.4 Rail signalling, electrical equipment
  - 2.14.5 Rail signalling, point actuator devices
  - 2.14.7 Rail signalling, computer-based equipment
  - 2.14.13 Rail signalling, electro-pneumatic equipment
  - 2.14.14 Rail signalling, drawings and diagrams
  - 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.5 Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions

about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and maintain power operated signalling equipment as described in 7) and including:
    - A Interpreting specifications and circuit diagrams correctly
    - B Using appropriate fault finding techniques
    - C Installing and maintaining power operated signalling equipment to operational requirements
    - D Organising work to minimise traffic disruptions

- E Using tools and test equipment correctly
- F Following relevant codes of practice and environmental protection procedures and requirements
- G Completing relevant documentation
- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and maintaining power operated signalling equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key**

**8.6)**

**competencies**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 5.2; 5.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4; 2.2; 4.2; 4.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 5.1; 5.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 3.2 to 3.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 4.2; 4.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.3; 4.2; 4.3	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  5.2; 5.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 2.2 to 2.4; 3.2 to 3.4; 4.2; 4.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.5; 4.4

## **UEENEEN012A      Maintain power signalling and protective relay interlocking systems**

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers maintenance and repair of power signalling and protective relay interlocking systems in a rail network. It encompasses safe working, regulatory requirements and following work procedures, performing schedules maintenance, diagnosing and repairing system faults, performing operational tests and reporting.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      4      Writing      4      Numeracy      4
<b>Application of the Unit</b>	<b>3)</b>  This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.
<b>Competency Field</b>	<b>4)</b>  Rail

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to maintain equipment and repair faults	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of maintenance and repair work is determined from job specifications, drawings and regulatory requirements</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others to minimise traffic disruptions.</p> <p>1.5 Materials needed maintenance and repair work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.6 Tools, equipment and testing devices needed for maintenance and repair work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Perform schedule maintenance	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Visual inspection or installation wiring and equipment is carried out to identify damaged or faulty equipment.</p> <p>2.3 Damaged or faulty components identified from visual inspection are replaced as per technical instructions, manufacturer specifications and maintenance procedures.</p> <p>2.4 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p> <p>2.5 Maintenance is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.</p>
3. Diagnose and repair system faults	3.1 OHS risk control measures and procedures for carrying out the work are followed.

- 3.2 Systems are interrogated using appropriate fault finding and diagnostic techniques to identify faults.
- 3.3 Fault indicators and maintenance records are used to assist in the identification of faults
- 3.4 Repairs, replacement and/or adjustment or equipment/systems are carried out using appropriate tools and test equipment to ensure equipment/systems function to required technical and operational standards.
- 3.5 Faulty, worn, damaged or insecure components are repaired, replaced or secured whilst ensuring system safety integrity is maintained and technical/manufacturers requirements are met.
- 3.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 3.7 Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 4. Perform operational testing
  - 4.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 4.2 The system is tested using approved test procedures and equipment to ensure it operates within specified technical parameters.
- 5 Report maintenance and repair activities
  - 5.1 OHS work completion risk control measures and procedures are followed.
  - 5.2 Reusable, faulty, worn components are tagged and dispatched for repair to maintain adequate spares.
  - 5.3 Maintenance work activities are recorded as per organisation requirements to provide accurate records
  - 5.4 Documentation including component faults, test results, authorisations and permits is completed to provide an accurate database and facilitate follow up action.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining power signalling and relay interlocking systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.2.2	Enterprise work activities records
2.3.13	Using supervisory control and data acquisition systems
2.4.16	Personal computers, engineering applications software basic
2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.14.1	Basic rail operations
2.14.2.1	Rail signalling principles, electrical
2.14.4	Rail signalling, electrical equipment
2.14.11	Rail signalling, interlocking systems
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain power signalling and relay interlocking systems as described in 7) and including:
    - A Interpreting specifications correctly,
    - B Using appropriate fault finding techniques,
    - C Maintaining electrically-operated signalling equipment to operational requirements,
    - D Organising work to minimise traffic disruptions,
    - E Using tools correctly,
    - F Following relevant codes of practice, OHS and environmental protection procedures and requirements, and
    - G Completing relevant records and documentation
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:  
 Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:  
 Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and maintaining power signalling and relay interlocking systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:  
 Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	5.2 to 5.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.2; 3.2; 3.3; 4.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 3.2; 4.2	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 3.2 to 3.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.2; 3.3; 4.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  5.2 to 5.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2; 2.3; 3.3 to 3.5; 4.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.7

## UEENEEN013A Install and test computer based interlocking equipment

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers installation and testing of computer based interlocking equipment for rail network signalling. It encompasses safe working, regulatory requirements and following installation specifications, installing computer equipment, associated electronic equipment and track side interfaces, pre-commissioning activities, operational testing and reporting.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may only be practised in the workplace under the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Rail</p>						

### ELEMENT

### PERFORMANCE CRITERIA

5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to install and test computer based interlocking equipment	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.</p> <p>1.4 The extent of the installation is determined from job specifications, drawings and regulatory requirements</p> <p>1.5 Tools, equipment and testing devices needed to install the computer based interlocking equipment are obtained in accordance with established procedures and checked for correct operation and safety.</p> <p>1.6 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements.</p>
2 Install interlocking computers and computer data and communication link equipment.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Cubicles, computer housings and associated equipment are installed in accordance with specifications and work orders.</p> <p>2.3 Computer data link equipment is installed in accordance with specifications and work orders</p> <p>2.4 Modems and associated equipment is installed in accordance with specifications and work orders.</p> <p>2.5 Cables are installed and connections/terminations made, including plug couplers, in accordance with specifications and work orders.</p> <p>2.6 Installation is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.</p>

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|--|-----|---|
| 3. Install trackside interfaces                          | 3.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|  | 3.2 | Trackside function modules and interface equipment is installed in accordance with specifications and work orders.  |
|  | 3.3 | Cables are installed and connections/terminations made in accordance with specifications and work orders.   |
|  | 3.4 | Power supply is checked, adjusted and confirmed as being within specifications.   |
|  | 3.5 | Load required for testing is connected and confirmed in accordance with specifications  |
|  | 3.6 | Interface equipment is powered up in the correct sequence using correct fuse type and rating in preparation for testing.  |
|  | 3.7 | Installation is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 4. Conduct pre-commissioning power-up checks             | 4.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|  | 4.2 | All cards are checked for correct position and seating and all vital I/O connections isolated.  |
|  | 4.3 | Correct firmware module installation is confirmed in accordance with specifications   |
|  | 4.4 | Voltage level and polarities are confirmed through energising power supplies ‘off load’.  |
|  | 4.5 | Computer based interlocking equipment is energised and all message indications are checked as in compliance with specifications.  |
|  | 4.6 | ‘On load’ voltage levels are checked for compliance with specification.   |
| 5. Test computer based interlocking equipment operations | 5.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|  | 5.2 | Message generator is connected in accordance with testing procedures.   |

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|---|-----|--|
|   | 5.3 | Test sequences are run in accordance with testing procedures to confirm that equipment is installed correctly and to test all equipment functions. |
|   | 5.4 | Test results are monitored, measured and recorded to confirm all operations are with specification.  |
| 6 Document installation and testing completion work | 6.1 | OHS work completion risk control measures and procedures are followed.   |
|   | 6.2 | Work site is made safe in accordance with established safety procedures.   |
|   | 6.3 | Any non-compliance operation or equipment are identified and corrective action recorded.   |
|   | 6.4 | Corrective action is implemented to rectify installation defects or replace faulty equipment.  |
|   | 6.5 | Operational integrity of the system is confirmed and recorded in accordance with TFM analysis sheets and checklists.                               |
|   | 6.6 | All work completion is documented and appropriate person(s) notified in accordance with established procedures.                                    |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and testing computer based interlocking equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

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|---------|--|
| 2.2.2   | Enterprise work activities records                       |
| 2.4.13  | Computer peripherals                                     |
| 2.5.4   | Technical standards, regulations and codes rail networks |
| 2.5.10  | Technical manuals and catalogues                         |
| 2.5.11  | Environmental and heritage awareness                     |
| 2.9.3.3 | Electronic switching                                     |
| 2.9.3.2 | Inverters  |
| 2.9.11  | Linear and switch mode power supplies                    |

- 2.10.1. Electronic communications, principles
- 2.14.1 Basic rail operations
- 2.14.6 Rail signalling, electronic equipment
- 2.14.7 Rail signalling, computer-based equipment
- 2.14.8 Rail signalling, computer applications
- 2.14.10 Rail signalling, remote control systems
- 2.14.11.1 Rail signalling interlocking systems, electrical
- 2.14.11.2 Rail signalling interlocking systems, mechanical
- 2.14.12 Rail signalling, power supplies
- 2.14.14 Rail signalling, drawings and diagrams
- 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.5 Rail safe working practices

## **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified

- in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Install and test computer based interlocking equipment as described in 7) and including:
      - A Complying with operational requirements
      - B Interpreting specifications and plans correctly
      - C Using appropriate testing and fault finding techniques
      - D Organising work
      - E Using tools and test equipment correctly
      - F Following relevant codes of practice, procedures and requirements
      - G Completing relevant records and documentation
      - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions

must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and testing computer based interlocking equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 6.3 to 6.6	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4; 3.4; 5.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2; 3.3; 5.4; 6.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 6.3; 6.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 4.3 to 4.6; 5.2 to 5.4; 6.4; 6.5	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  6.3; 6.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.5; 3.2 to 3.6; 4.2 to 4.6; 5.2 to 5.4; 6.3 to 6.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  6.4
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## **UEENEEN014A Maintain computer based and solid state interlocking systems**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers maintenance and repair of faults in computer based electronic equipment for rail network signalling system. It encompasses safe working, regulatory requirements and following work procedures monitoring system, responding to fault information, and replacing faulty equipment..</p>			
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>			
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>			
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Reading</td> <td style="text-align: center;">Writing</td> <td style="text-align: center;">Numeracy</td> </tr> </table>	Reading	Writing	Numeracy
Reading	Writing	Numeracy		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>			
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>			
<b>Competency Field</b>	<p><b>4)</b></p> <p>Rail</p>			

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to maintain computer based interlocking equipment	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of maintenance and repair work is determined from job specifications, drawings and regulatory requirements</p> <p>1.4 Materials needed maintenance and repair work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.5 Tools, equipment and testing devices needed to maintenance and repair work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Monitor system and respond to fault information	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Up-to-date reports of fault logs are gained by assessing the diagnostic terminal</p> <p>2.3 Fault correction activities are prioritised by reviewing the fault reports and corrective actions are implemented</p> <p>2.4 Records or previously actioned faults are deleted/cleared from the terminal</p> <p>2.5 The source of the fault is correctly identified by assessing the diagnostics terminal</p> <p>2.6 The corrective action required is determined and implemented</p> <p>2.7 Appropriate mechanisms for the safe and efficient rectification of the fault are ensured</p> <p>2.8 Actioned faults are deleted/cleared from the terminal</p>

- |                               |      |  |
|-------------------------------|------|--|
|                               | 2.9  | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |
|                               | 2.10 | System monitoring is conducted efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.       |
| 3. Replace faulty equipment   | 3.1  | OHS risk control measures and procedures for carrying out the work are followed  |
|                               | 3.2  | The correct replacement equipment is obtained from spare stock to comply with identified fault repair requirements   |
|                               | 3.3  | Faulty component/equipment is correctly identified and removed as per organisation practices and procedures  |
|                               | 3.4  | Replacement component equipment is correctly installed, connected and powered up as per manufacturer specifications  |
|                               | 3.5  | Correct test procedures are identified and implemented to confirm all operations are within specifications   |
|                               | 3.6  | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |
|                               | 3.7  | Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.              |
| 4. Monitor and test equipment | 4.1  | OHS risk control measures and procedures for carrying out the work are followed  |
|                               | 4.2  | Equipment operations are monitored to ensure system integrity  |
|                               | 4.3  | Signal and voltage levels are monitored, checked and adjusted if required to ensure compliance with operational requirements   |
|                               | 4.4  | Complete statistical records and equipment/operational management information is accurately recorded and maintained to support ongoing monitoring of systems and equipment performance |

- |   |   |   |
|---|---|---|
|   | 4.5   | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
| 5 | Arrange repair of faulty equipment and report work activities | <p>5.1 OHS risk control work completion measures and procedures are followed.</p> <p>5.2 Non conforming equipment is identified and tagged for repair type and extent of fault is identified and recorded as required</p> <p>5.3 Faulty equipment requiring repair is segregated and appropriate records are completed in preparation for dispatch to repairer</p> <p>5.4 Spare equipment stocks are reviewed to ensure adequate availability</p> <p>5.5 Priority for repair or replacement of equipment is established by evaluation of stock levels and fault logs</p> <p>5.6 Work completion is documented and appropriate personnel notified of repair and replacement priorities in accordance with established procedures</p> |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintain computer based interlocking equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- |  |         |  |
|--|---------|--|
|  | 2.2.2   | Enterprise work activities records                       |
|  | 2.3.13  | Using supervisory control and data acquisition systems   |
|  | 2.4.11  | Personal computers, hardware basic                       |
|  | 2.4.13  | Computer peripherals                                     |
|  | 2.5.4   | Technical standards, regulations and codes rail networks |
|  | 2.5.10  | Technical manuals and catalogues                         |
|  | 2.9.3.3 | Electronic switching                                     |
|  | 2.9.3.2 | Inverters  |

- 2.9.11 Linear and switch mode power supplies
- 2.10.1.1 Electronic communications, principles
- 2.14.1 Basic rail operations
- 2.14.6 Rail signalling, electronic equipment
- 2.14.7 Rail signalling, computer-based equipment
- 2.14.8 Rail signalling, computer applications
- 2.14.10 Rail signalling, remote control systems
- 2.14.11 Rail signalling, interlocking systems
- 2.14.12 Rail signalling, power supplies
- 2.14.14 Rail signalling, drawings and diagrams
- 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.5 Rail safe working practices

## **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified

in the performance criteria and range statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain computerised interlocking equipment as described in 7) and including:
    - A Maintaining computer based and solid state interlocking equipment to operational requirements and specifications
    - B Interpreting specifications and plans correctly
    - C Using appropriate testing and fault finding techniques
    - D Rectifying faults with minimal disruption to services
    - E Using tools and test equipment correctly
    - F Following relevant codes of practice, OHS and environmental protection procedures requirement
    - G Completing relevant records and documentation
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining computerised interlocking equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 5.2 to 5.6	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2 to 2.4; 4.3; 4.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 4.3; 4.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.8; 4.3;	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.4; 3.5; 4.3	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  5.2 to 5.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2 to 2.8; 3.2 to 3.5; 4.2 to 4.4; 5.2 to 5.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 3.6; 4.5
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## **UEENEEN015A      Conduct routine inspecting and testing of new signal cables and lines**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers testing or newly installed signal and power cables for a rail network signalling system. It encompasses safe working, regulatory requirements and following work procedures, visual inspection, cable testing, rectifying defects and verifying and certifying integrity of cables.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Rail</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to inspect and test cables and lines	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of inspection and testing is determined from job specifications, drawings and regulatory requirements</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site</p> <p>1.5 Materials needed for inspection and testing are obtained in accordance with established procedures and checked against job requirements</p> <p>1.6 Tools, equipment and testing devices needed to inspect and test are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Inspect and test cables and line	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Installed cable/line are inspected to ensure installation and cable conforms to organization and technical specifications for cable laying.</p> <p>2.3 Cable/line route specification and technical data is reviewed to ensure specified cables have been laid.</p> <p>2.4 Cable/line is tested to ensure continuity or circuit in accordance with technical requirements and /or specifications.</p> <p>2.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p> <p>2.6 Inspection and testing is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.</p>

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| 3. Rectify faults and defects                  | 3.1 | OHS risk control measures and procedures for carrying out the work are followed.   |
|  | 3.2 | Isolated cable/line faults are rectified in accordance with organization procedures and technical instructions to ensure cable/line route technical specifications are met                 |
|  | 3.3 | Defects in cable/line installation are rectified where necessary to ensure all aspects of cable/line route conforms to specifications including conduit, clamps and other securing devices |
|  | 3.4 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |
|  | 3.5 | Faults and defects are rectified efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.         |
| 4. Certify cable and line integrity and report | 4.1 | OHS work completion risk control measures and procedures are followed.   |
|  | 4.2 | Faults and defects are documented and corresponding faults or defects. Detailed corrective action is recorded for subsequent engineering review  |
|  | 4.3 | All test results are documented and test compliance results are recorded for commissioning purposes  |
|  | 4.4 | Cable/line installation documentation required for commissioning is prepared for handover to engineers for commissioning   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conducting routine inspection and testing of newly installed signal cables and lines. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

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| 2.2.2  | Enterprise work activities records                          |
| 2.4.16 | Personal computers, engineering applications software basic |
| 2.5.4  | Technical standards, regulations and codes rail networks    |

- 2.5.10 Technical manuals and catalogues
- 2.5.11 Environmental and heritage awareness
- 2.11.8 Data and voice cabling testing and testing devices
- 2.14.4 Rail signalling, electrical equipment
- 2.14.5 Rail signalling, point actuators devices
- 2.14.6 Rail signalling, electronic equipment
- 2.14.7 Rail signalling, computer-based equipment
- 2.14.8 Rail signalling, computer applications
- 2.14.9 Rail signalling, train detection
- 2.14.10 Rail signalling, remote control systems
- 2.14.11 Rail signalling, interlocking systems
- 2.14.12 Rail signalling, power supplies
- 2.14.13 Rail signalling, electro-pneumatic equipment
- 2.14.14 Rail signalling, drawings and diagrams
- 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.5 Rail safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network
- Code of practice for the defined interstate rail network
- Signal cable
- Low voltage cable
- High voltage power cable
- Optical fibre cable

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct routine inspection and testing of newly installed signal cables and lines as described in 7) and including:
    - A Interpreting plans and specifications correctly
    - B Testing new cable/line route in accordance with workplace procedures
    - C Using test equipment and tools correctly and safely
    - D Confirming the integrity of the cable system
    - E Checking that technical/operational specifications are met and that cable/line route in compliance with specifications
    - F Applying effective cable fault diagnosis and repair techniques
    - G Following relevant codes of practice, OHS and environmental protection procedures and requirements
    - H Completing relevant records and documentation
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting routine inspection and testing of newly installed signal cables and lines.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.2 to 4.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 3.2; 3.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

### **Skills Enabling Employment**

#### **8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.2 to 4.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.2; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.4

## **UEENEEN016A      Maintain electronic switched and microprocessor-based remote control systems**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers maintain operational status of electronic switched microprocessor based remote control system for a rail network signalling system. It encompasses safe working, regulatory requirements and following work procedures, including co-ordinating and fault finding and repairs, inspecting and rectifying defects, analysing and determining the cause of faults, rectifying faults and recording.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Rail</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to maintain control system	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Maintenance programs/fault/irregularity reports are reviewed to establish work priorities, resources, logistics and site information</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others affected by the work and authorisations are obtained in accordance with established procedures.</p> <p>1.5 Materials needed for the work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Inspect and rectify anomalies	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Visual inspection is carried out and all equipment checked to ensure performance is in accordance with operational specifications</p> <p>2.3 Security of fittings, terminations and mountings are checked for conformance with specifications and adjusted accordingly</p> <p>2.4 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p> <p>2.5 Inspection and rectification is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.</p>
3. Analysis system performance	3.1 OHS risk control measures and procedures for carrying out the work are followed

- 3.2 Appropriate operating parameters are ascertained from specifications and commissioning data to enable performance checked to be completed
- 3.3 Appropriate diagnostic techniques are employed to verify symptoms or irregularities
- 3.4 Symptoms are reproduced, monitored and documented where appropriate
- 3.5 System is adjusted and operationally tested to technical parameters and design specifications
- 3.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 3.7 Analysis is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 4. Determine cause and rectify faults
  - 4.1 OHS risk control measures and procedures for carrying out the work are followed
  - 4.2 Appropriate conclusions are drawn from fault indicators, error codes, maintenance records and print outs to assist fault finding
  - 4.3 Appropriate technical support is obtained if required
  - 4.4 Faulty components are replaced or repaired in accordance with workplace procedures
  - 4.5 Components are terminated, connected, system levels adjusted and parameters set in accordance with specifications
  - 4.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
  - 4.7 Fault diagnosis and rectification is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 5. Test system functionality and report
  - 5.1 OHS completion risk control work measures and procedures are followed.
  - 5.2 System is functionally tested to specified parameters

- 5.3 Maintenance documentation is completed as required and equipment is labelled, packaged and returned to service where appropriate

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining electronic switched and microprocessor-based remote control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.2 Enterprise work activities records
- 2.3.13 Using supervisory control and data acquisition systems
- 2.4.11 Personal computers, hardware basic
- 2.4.16 Personal computers, engineering applications software basic
- 2.4.13 Computer peripherals
- 2.5.4 Technical standards, regulations and codes rail networks
- 2.5.10 Technical manuals and catalogues
- 2.9.3.2 Electronic switching
- 2.9.3.2 Inverters
- 2.9.3.3 Electronic switching
- 2.9.11 Linear and switch mode power supplies
- 2.10.1.1 Electronic communications, principles
- 2.14.6 Rail signalling, electronic equipment
- 2.14.8 Rail signalling, computer applications
- 2.14.10 Rail signalling, remote control systems
- 2.14.14 Rail signalling, drawings and diagrams
- 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices

## 2.18.5 Rail safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State or Territory codes of practice and safe working requirements
- Equipment and systems relevant to the rail network for which competency is sought
- Code of practice for Defined Interstate Rail Networks
- System monitoring and performance analysis detecting and rectifying at least five different system faults

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

### EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material

present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain electronic switched and microprocessor-based remote control systems as described in 7) and including:
    - A Interpreting specifications, circuit diagrams and workplace procedures correctly
    - B Using appropriate diagnosis and fault finding techniques to sub-module level

- C Maintaining electronic switched and microprocessor-based remote control systems to operational requirements (to sub module level)
- D Working efficiently and effectively
- E Using tools and test equipment correctly
- F Following relevant codes of practice, OHS and environmental protection procedures and requirements
- G Completing relevant records and documentation
- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining electronic switched and microprocessor-based remote control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3; 5.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2; 2.3; 3.2 to 3.5; 4.2; 4.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 4.3	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 3.2 to 3.5; 4.2 to 4.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.3; 3.3 to 3.5; 4.5; 5.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  5.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2; 2.3; 3.2 to 3.5; 4.2 to 4.5; 5.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4; 3.6; 4.6

## UEENEEN017A Install and maintain transmission interface equipment

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers installing and maintaining transmission interface equipment for a rail network system. It encompasses safe working, regulatory requirements and following work procedures, scheduled maintenance, equipment installation and testing, diagnosing and rectifying faults and reporting.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Rail</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to install, test or maintain services	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of installation, testing or maintenance is determined from job specifications, drawings and regulatory requirements</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others to minimise service disruptions.</p> <p>1.5 Materials needed for installation, testing or maintenance are obtained in accordance with established procedures and checked against job requirements</p> <p>1.6 Tools, equipment and testing devices needed for installation, testing or maintenance are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Install equipment and test services	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 New services and hardware are installed to ensure equipment/system performs to operational requirements.</p> <p>2.3 New service is tested using the appropriate test procedures and commissioning results are documented to industry and workplace requirements.</p> <p>2.4 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p> <p>2.5 Installation and testing is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.</p>

- |    |                               |     |   |
|----|-------------------------------|-----|---|
| 3. | Diagnose and repair faults    | 3.1 | OHS risk control measures and procedures for carrying out the work are followed   |
|    |                               | 3.2 | A fault and possible cause are narrowed down to system/unit/component using diagnostic fault finding procedures and appropriate test equipment  |
|    |                               | 3.3 | The nature and possible cause of the fault are established and using a range of test equipment to implement approved test procedures  |
|    |                               | 3.4 | Fault system/unit/component is replaced and configured to ensure compatibility with overall system  |
|    |                               | 3.5 | Services covered by the transmission system are tested to ensure all customers needs are met and the fault is 'cleared' from the indicator  |
|    |                               | 3.6 | Faulty equipment is tagged and documented and repair/replacement arrangements are initiated   |
|    |                               | 3.7 | The status of vital services affected is established  |
|    |                               | 3.8 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|    |                               | 3.9 | Diagnosis and fault repair is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 4. | Perform scheduled maintenance | 4.1 | OHS risk control measures and procedures for carrying out the work are followed   |
|    |                               | 4.2 | Routine maintenance is undertaken to ensure equipment is performing as required   |
|    |                               | 4.3 | Remote monitoring is maintained and periodic checks conducted to ensure remote monitoring is functional   |
|    |                               | 4.4 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|    |                               | 4.5 | Scheduled maintenance is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.        |
| 5  | Finalise work and report      | 5.1 | OHS work completion risk control measures and procedures are followed.  |

- 5.2 Appropriate documentation is completed where required with fault/maintenance records being maintained for assessment/monitoring purposes

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and maintaining transmission interface equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.2 Enterprise work activities records
- 2.3.13 Using supervisory control and data acquisition systems
- 2.4.11 Personal computers, hardware basic
- 2.4.16 Personal computers, engineering applications software basic
- 2.4.13 Computer peripherals
- 2.5.4 Technical standards, regulations and codes rail networks
- 2.5.10 Technical manuals and catalogues
- 2.10.1.1 Electronic communications, principles
- 2.14.6 Rail signalling, electronic equipment
- 2.14.7 Rail signalling, computer-based equipment
- 2.14.8 Rail signalling, computer applications
- 2.14.10 Rail signalling, remote control systems
- 2.14.14 Rail signalling, drawings and diagrams
- 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.5 Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State or Territory codes of practice and safe working requirements
- Equipment and systems relevant to the rail network for which competency is sought
- Code of practice for Defined Interstate Rail Networks
- Installing and maintaining with at least five items of equipment with different transmission interface functions
- Locating and rectifying at least two different faults in each item of transmission interface equipment

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its

‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and maintain transmission interface equipment as described in 7) and including:
    - A Interpreting specifications, plans and circuit diagrams correctly,
    - B Responding to fault indicators appropriately,
    - C Using appropriate diagnostic and fault finding techniques
    - D Installing, maintaining and confirming integrity of transmission interface equipment to operational standards

- E Organising work to minimise traffic disruptions
- F Using tools and test instruments correctly
- G Following relevant codes of practice, OHS and environmental protection procedures and requirements
- H Completing relevant records and documentation
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and maintaining transmission interface equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 5.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 3.2; 3.3; 4.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2; 3.2; 3.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3; 3.2; 3.3; 4.3	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  5.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.2; 2.3; 3.2 to 3.7; 4.2; 4.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4; 3.8; 4.4

## **UEENEEN018A Find and repair wiring system faults**

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers finding and repairing faults with signal, data, and power wiring systems. It encompasses safe working, regulatory requirements and following work procedures, predicting likely wiring system faults, using appropriate fault finding techniques, repairing or rectifying faults and reporting.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      4      Writing      4      Numeracy      4
<b>Application of the Unit</b>	<b>3)</b>  This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.
<b>Competency Field</b>	<b>4)</b>  Rail

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to find and repair wiring system faults	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.</p> <p>1.4 Appropriate persons are consulted to establish the nature of the fault and to coordinate effectively with others affected by the fault.</p> <p>1.5 Likely causes of the fault and order of probability are determined from system data and historical trend.</p> <p>1.6 Impact of the fault on system is ascertained and appropriate personnel notified in accordance with established procedures.</p> <p>1.7 Materials needed to find and repair the fault are obtained in accordance with established procedures and checked against job requirements</p> <p>1.8 Tools, equipment and testing devices needed to find and repair the fault are obtained in accordance with established procedures and checked for correct operation and safety.</p> <p>1.9 Circuits/equipment are checked as being isolated where necessary in strict accordance operational procedures and OHS requirements.</p>
2 Find wiring system faults	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of cable performance parameters is applied to appropriate fault finding techniques.</p> <p>2.3 Tests are conducted to determine the type and finding of the fault.</p>

- |   |                               |   |
|---|-------------------------------|---|
|   | 2.4                           | Wiring system is visually inspected for physical damage or installation defects where necessary.  |
|   | 2.5                           | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|   | 2.6                           | Ongoing checks of the wiring system are undertaken to confirm the continued existence of the fault.   |
|   | 2.7                           | Faults are located and identified efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Implement fault rectification |   |
|   | 3.1                           | OHS risk control measures and procedures for carrying out the work are followed.  |
|   | 3.2                           | Wiring system faults are rectified in accordance with established procedures  |
|   | 3.3                           | Unresolved faults are reported to appropriate persons for further action in accordance with established procedures.   |
|   | 3.4                           | Inspection and test results actions taken or recommended are documented and appropriate person(s) notified in accordance with established procedures.                               |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and repairing of faults with signal, data, and power wiring systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.2.2   | Enterprise work activities records                          |
| 2.4.16  | Personal computers, engineering applications software basic |
| 2.4.13  | Computer peripherals  |
| 2.5.4   | Technical standards, regulations and codes rail networks    |
| 2.5.10  | Technical manuals and catalogues                            |
| 2.5.11  | Environmental and heritage awareness                        |
| 2.9.3.2 | Inverters   |

2.9.3.3	Electronic switching
2.9.11	Linear and switch mode power supplies
2.10.1.1	Electronic communications, principles
2.11.8	Data and voice cabling testing and testing devices
2.14.6	Rail signalling, electronic equipment
2.14.7	Rail signalling, computer-based equipment
2.14.8	Rail signalling, computer applications
2.14.10	Rail signalling, remote control systems
2.14.11.1	Rail signalling interlocking systems, electrical
2.14.11.2	Rail signalling interlocking systems, mechanical
2.14.12	Rail signalling, power supplies
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State or Territory codes of practice and safe working requirements
- Equipment and systems relevant to the rail network for which competency is sought
- Code of practice for Defined Interstate Rail Networks
- Finding and repairing three different types of faults on high performance copper data cable and low voltage power wiring systems

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and repair of faults with signal, data, and power wiring systems, as described in 7) and including:
    - A Interpreting plans and specifications correctly
    - B Identifying and interpreting fault history
    - C Identifying faults efficiently
    - D Rectifying faults promptly using appropriate diagnostic techniques
    - E Minimising interruption to services
    - F Using testing equipment and tools correctly and safely
    - G Confirming the integrity of the wiring system
    - H Following relevant codes of practice
    - I Completing relevant records
    - J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:  
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:  
Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in finding and repairing of faults with signal, data, and power wiring systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:  
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 2.3; 2.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 1.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.2; 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.3; 2.6	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.2 to 2.6; 3.2; 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEN019A Test equipment and isolate faults

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the testing and isolation of signalling equipment and infrastructure. It encompasses safe working, regulatory requirements, work procedures, checking of operational and functional capabilities and the isolation of signalling equipment and infrastructure and reporting.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Rail</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to test and/or isolate equipment	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.</p> <p>1.4 Testing is appropriately sequenced in accordance with job schedule.</p> <p>1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.6 Location of equipment to be tested/isolated is determined from job specifications and diagrams.</p> <p>1.7 Materials needed for testing obtained in accordance with established procedures and checked against job requirements.</p> <p>1.8 Tools, equipment and testing devices needed to test and/or isolate are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Test and/or isolate equipment.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 All consumables are used and disposed of in compliance with material safety sheets and OHS codes and practices.</p> <p>2.3 Application of on-track safety requirements is performed to enterprise standards</p> <p>2.4 Initial visual check of operational equipment is performed to identify any equipment faults.</p> <p>2.5 Identified equipment is isolated in accordance with relevant operational rules and procedures</p>

- |  |     |  |
|--|-----|--|
|  | 2.6 | Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.  |
|  | 2.7 | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
| 3. Check equipment operation.                      | 3.1 | OHS work completion risk control measures and procedures are followed.   |
|  | 3.2 | Approval to conduct a check of equipment operation is obtained in accordance with relevant operational rules and procedures.                                     |
|  | 3.3 | Track clearance check is made before conducting equipment operation check to ensure safe train movement.   |
|  | 3.4 | Authorised equipment check is carried out in accordance with operating procedures to identify any equipment faults.  |
|  | 3.5 | Operational effectiveness of equipment is confirmed through observation during train movements if required.  |
|  | 3.6 | Equipments faults are correctly identified, recorded and appropriate corrective action is taken.   |
|  | 3.7 | Service equipment is locked and secured to prevent unauthorised access.  |
|  | 3.8 | Work completion is documented and appropriate person(s) notified in accordance with established procedures.  |
| 4. Finalise testing and/or isolation of equipment. | 4.1 | OHS work completion risk control measures and procedures are followed.   |
|  | 4.2 | Test results are documented in accordance with organisation requirements and faulty or replaced equipment is tagged and dispatched to maintain equipment spares. |
|  | 4.3 | Fully operational equipment is handed over to approved personnel ensuring that hand over procedures are accurately followed and final documentation is completed |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and . The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.2 Enterprise work activities records
- 2.4.11 Personal computers, hardware structure
- 2.4.16 Personal computers, engineering applications software basic
- 2.4.13 Computer peripherals
- 2.5.4 Technical standards, regulations and codes rail networks
- 2.5.10 Technical manuals and catalogues
- 2.5.11 Environmental and heritage awareness
- 2.9.3.2 Inverters
- 2.9.3.3 Electronic switching
- 2.9.11 Linear and switch mode power supplies
- 2.10.1.1 Electronic communications, principles
- 2.14.1 Basic rail operations
- 2.14.2.2 Rail signalling principles, mechanical
- 2.14.3 Rail signalling, mechanical equipment
- 2.14.5 Rail signalling, point actuators devices
- 2.14.6 Rail signalling, electronic equipment
- 2.14.7 Rail signalling, computer-based equipment
- 2.14.8 Rail signalling, computer applications
- 2.14.11.2 Rail signalling, interlocking systems, mechanical
- 2.14.13 Rail signalling, electro-pneumatic equipment
- 2.14.14 Rail signalling, drawings and diagrams
- 2.14.15 Rail signalling, regulations and codes

- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.5 Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State/Territory codes of practice and safe working requirements.
- Equipment relevant to a particular rail network.
- Code of practice for the defined interstate rail network.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material

present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Test equipment and isolate faults as described in 7) and including:
    - A Interpreting specifications correctly
    - B Application of on-track safety requirements to enterprise standards
    - C Testing that equipment is fully functional after testing

and isolation

- D Checking that technical/operational specifications are met and that equipment is in compliance with work orders
- E Applying effective fault diagnosis techniques
- F Ensuring safe train movement through work area
- G Following relevant codes of practice, OHS and environmental protection procedures and requirements
- H Completing relevant records and documentation
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining computerised interlocking equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.6; 1.7;	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 3.2;	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5; 3.4;	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.7 and 3.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.6;	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.2 and 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.3 and 2.7;

## **UEENEEN020A      Install electrical power and control equipment for rail networks**

### **Unit Descriptor**

**1)**

This unit covers installation of electrical power and control equipment. It encompasses working safely and to installation/maintenance standards, matching equipment with that specified for a given location, terminating cables and connecting wiring, compliance and functional testing and completing the necessary installation documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit may only be practised in the workplace under regulations related to electrical work, the codes of practice and regulations of the State/Territory in which the work is carried out. This includes the ‘Code Of Practice for the Define Interstate Rail Network’ for work carried out on that network.

### **Competency Field**

**4)**

Rail

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to install electrical power and/or control equipment.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards which have not previously been identified are noted, and established risk control measures are implemented.</p> <p>1.4 Nature of the work and location of electrical power and/or control equipment is determined by site inspection and from job instructions, specifications and/or diagrams.</p> <p>1.5 Materials needed for the installation work are obtained in accordance with established procedures and checked against job requirements.</p> <p>1.6 Tools, equipment and testing devices needed to install electrical power and/or control equipment are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Install electrical power and/or control equipment	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Where applicable on-track safety requirements are complied with to enterprise standards</p> <p>2.2 Power and/or control equipment is installed to comply with technical standards and job specifications and requirements.</p> <p>2.3 Wiring is run and cables terminated to comply with technical standards and job specifications and requirements.</p> <p>2.4 Tests are conducted to ensure installed electrical power and/or equipment comply with specifications and functions as intended.</p> <p>2.5 Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.</p>

		2.6	Installation of electrical power and/or control equipment is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3	Test electrical power and/or control equipment	3.1	OHS risk control measures and procedures for carrying out the work are followed.
		3.2	Correct functioning of equipment is established by reference to manuals, system specifications and commissioning data.
		3.3	Faults are identified by reference to appropriate technical information and applying knowledge of power operated signalling equipment and logical fault finding techniques.
		3.4	Faulty, worn, damaged or insecure components are replaced, repaired or secured in accordance with manufacturer specifications and enterprise requirements.
		3.5	Tests are conducted to ensure electrical power and/or control equipment comply with specifications and functions as intended.
		3.6	Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.
4	Complete installation of electrical power and/or control equipment.	4.1	OHS work completion risk control measures and procedures are followed.
		4.2	Work site is cleaned and made safe in accordance with established procedures.
		4.3	Work completion is documented and appropriate person(s) notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing electrical power and control equipment for rail networks. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.2.2 Enterprise work activities records

2.4.16	Personal computers, engineering applications software basic
2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.9.3.2	Inverters
2.9.3.3	Electronic switching
2.9.11	Linear and switch mode power supplies
2.14.12	Rail signalling, power supplies
2.14.13	Rail signalling, electro-pneumatic equipment
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State or Territory codes of practice and safe working requirements
- Equipment relevant to a particular rail network
- Code of practice for Defined Interstate Rail Networks

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified

in the performance criteria and range statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install electrical power and control equipment for rail networks as described in 7) and including:
    - A Interpreting specifications and circuit diagrams correctly
    - B Maintaining, repairing and installing power supplies and control equipment correctly
    - C Using appropriate diagnostic and fault finding techniques
    - D Using tools and test instruments correctly
    - E Following relevant codes of practice, procedures and requirements
    - F Completing relevant records and documentation
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing electrical power and control equipment for rail networks.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.5	

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 3.1 to 3.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.6
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# **UEENEEN021A    Reserved**

## **UEENEEN022A    Reserved**

# **UEENEEN023A    Reserved**

## **UEENEEN024A    Reserved**

## UEENEEN025A **Coordinate and manage track protection**

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the coordination and management of track protection. It encompasses safe working, regulatory requirements and work procedures, including planning, establishing, monitoring and withdrawing track protection, and documentation.</p>						
<b>Prerequisite Unit(s)</b>	2)						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may only be practised in the workplace under the codes of practice and regulations of the State/Territory for which the work is carried out. This includes the ‘Code of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Rail</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to establish track protection.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented.</p> <p>1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.6 Location of track protection is determined from job specifications and diagrams.</p> <p>1.7 Documentation needed for track protection work is obtained in accordance with established procedures and checked against job requirements.</p> <p>1.8 Tools and safety equipment needed to apply on track protection are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2 Establish and monitor track protection.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Track protection system is established in accordance with relevant safe working system</p> <p>2.3 Protection system and equipment is constantly reviewed for compliance with standards/regulations to ensure ongoing protection.</p> <p>2.4 Relevant authority/ personnel are liaised with as required to ensure maximum protection is maintained</p> <p>2.5 Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.</p> <p>2.6 Unexpected situations are dealt with safely and with the approval of an authorised person.</p>

- |   |                            |     |   |
|---|----------------------------|-----|---|
| 3 | Withdraw Track Protection. | 3.1 | OHS work completion risk control measures and procedures are followed.  |
|   |                            | 3.2 | Approval to remove track protection is obtained in accordance with relevant operational rules and procedures. |
|   |                            | 3.3 | Equipment and personnel are removed in a safe manner  |
|   |                            | 3.4 | Documentation is completed and track protection is withdrawn  |
|   |                            | 3.5 | On-track safety equipment is secured and stored in an appropriate manner                                      |
|   |                            | 3.6 | Work completion is documented and appropriate person(s) notified in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and co-ordinating and managing track protection. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- |         |  |
|---------|--|
| 2.5.4   | Technical standards, regulations and codes rail networks |
| 2.5.11  | Environmental and heritage awareness                     |
| 2.14.1  | Basic rail operations                                    |
| 2.14.14 | Rail signalling, drawings and diagrams                   |
| 2.14.15 | Rail signalling, regulations and codes                   |
| 2.18.1  | Occupational Health and Safety principles                |
| 2.18.2  | Electrical Safe working practices                        |
| 2.18.5  | Rail safe working practices                              |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State or Territory codes of practice and safe

working requirements

- Equipment relevant to a particular rail network
- Code of practice for Defined Interstate Rail Networks

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Co-ordinate and manage track protection as described in 7) and including:
    - A Interpreting specifications correctly
    - B Application of on-track safety requirements to enterprise standards
    - C Checking that track safety specifications are met and that protection is in compliance with enterprise standards
    - D Ensuring safe train movement through work area
    - E Following relevant codes of practice, OHS and environmental protection procedures and requirements
    - F Completing relevant records and documentation
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in the holistic assessment with the above listed items.

Note:  
Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:  
Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in co-ordinating and managing track protection.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:  
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 2.2; 3.8	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 3.8	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8; 2.2 to 3.2; 3.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.8; 2.9	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.6; 2.10	1

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.5; 3.8
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8; 3.2; 3.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8; 2.9

## UEENEEN026A    **Develop rail signalling maintenance programs**

<b>Unit Descriptor</b>	<p>1)</p> <p>This unit covers the development of programs for the maintenance of rail signalling equipment and infrastructure. It encompasses safe working, regulatory requirements, work procedures including identifying tasks and work responsibilities and reporting.</p>						
<b>Prerequisite Unit(s)</b>	<p>2)</p>						
<b>Competencies</b>	<p>2.1)</p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p>2.2)</p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p>3)</p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling.</p>						
<b>Licence to practise</b>	<p>3.1)</p> <p>The skills and knowledge described in this unit may only be practised in the workplace under the codes of practice and regulations of the State/Territory for which the work is carried out. This includes the ‘Code of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p>4)</p> <p>Rail</p>						

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1	Prepare to develop maintenance programs.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	Safety hazards that have previously been identified are noted, and established risk control measures are implemented.
		1.4	Maintenance programming is appropriately sequenced in accordance with job schedule.
		1.5	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
		1.6	Location of equipment to be maintained is determined from job specifications and diagrams.
2	Develop maintenance programs	2.1	Maintenance programs are developed to cover all work requirements with regard to relevant workplace conditions
		2.2	Programs are arranged to allow sufficient flexibility to allow contingency plans to be implemented
		2.3	Programs are circulated in accordance with workplace policies and procedures for review by affected personnel
		2.4	Established methods for dealing with unexpected situations are discussed with appropriate person(s) and documented.
3	Finalise maintenance program.	3.1	Feedback from personnel associated with the maintenance program is addressed and acceptable modifications agreed.
		3.2	Final rosters are documented and distributed to ensure work requirements are accurately communicated.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing maintenance programs. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.5.4	Technical standards, regulations and codes rail networks
2.5.10	Technical manuals and catalogues
2.5.11	Environmental and heritage awareness
2.14.1	Basic rail operations
2.14.2.2	Rail signalling principles, mechanical
2.14.3	Rail signalling, mechanical equipment
2.14.5	Rail signalling, point actuators devices
2.14.11.2	Rail signalling, interlocking systems, Mechanical
2.14.13	Rail signalling, electro-pneumatic equipment
2.14.14	Rail signalling, drawings and diagrams
2.14.15	Rail signalling, regulations and codes
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practices
2.18.5	Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State or Territory codes of practice and safe working requirements
- Equipment relevant to a particular rail network
- Code of practice for Defined Interstate Rail Networks

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop maintenance programs as described in 7) and including:
    - A Interpreting specifications correctly
    - B Checking that technical/operational specifications are met and that equipment is in compliance with work orders
    - C Ensuring safe train movement through work area
    - D Following relevant codes of practice, OHS and environmental protection procedures and requirements
    - E Completing relevant records and documentation
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

## Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing maintenance programs.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.5; 2.2; 3.2	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.1; 1.3; 2.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8; 2.2 to 3.2	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6; 3.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEN027A Decommission electrical and electro-mechanical signalling from service

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the de-commissioning of electrical and electro-mechanical signalling systems from service on rail networks. It encompasses safe working, regulatory requirement work procedures, disconnection of operating and redundant circuitry, equipment and components, testing of remaining circuitry and equipment, finding and repairing faults, testing of control and indicating equipment and reporting.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Reading</td> <td style="width: 5%;">3</td> <td style="width: 25%;">Writing</td> <td style="width: 5%;">3</td> <td style="width: 25%;">Numeracy</td> <td style="width: 5%;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit may only be practised in the workplace under the codes of practice and regulations of the State/Territory for which the work is carried out. This includes the ‘Code of Practice for the Define Interstate Rail Network’ for work carried out on that network.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Rail</p>						

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit		Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.	
1	Prepare to disconnect electrical/electromechanical circuits, equipment and components	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	The extent of disconnection is determined from, job specifications, design drawings and regulatory requirements.
		1.4	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
		1.5	Materials needed for the safe disconnection of circuits, equipment and components are obtained in accordance with established procedures and checked against job requirements.
		1.6	Tools, equipment and testing devices needed to disconnect circuits, equipment and components are obtained in accordance with established procedures and checked for correct operation and safety.
2.	Perform disconnection of circuits, equipment and components	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Where applicable on-track safety requirements are complied with to enterprise standards
		2.3	Visual inspection is carried out and all circuits, equipment and components are checked to ensure they are in accordance with manufacturer and systems specifications.
		2.4	Disconnecting work includes the isolation and removal of redundant wiring and the termination of altered wiring, checking and adjusting levels, checking indicators and system operation is carried out to organisation requirements.
		2.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.

- |  |     |   |
|--|-----|---|
|  | 2.6 | Disconnection is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.                |
| 3. Find and repair faults  | 3.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|  | 3.2 | System and design faults are verified using appropriate technical information, fault finding and diagnostic techniques to identify faulty signalling equipment.                             |
|  | 3.3 | Faulty signalling equipment is replaced, adjusted and secured in accordance with manufacturer specifications and organisation procedures.   |
|  | 3.4 | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.   |
|  | 3.5 | Fault finding and repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 4. Test and adjust remaining signalling circuits, equipment and components | 4.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|  | 4.2 | Control equipment is adjusted and tested using appropriate test procedures and equipment to ensure it operates within the specified technical parameters.                                   |
| 5. Finalise decommissioning work   | 5.1 | OHS work completion risk control measures and procedures are followed.  |
|  | 5.2 | System faults are identified and reported for follow-up action.   |
|  | 5.3 | Test results are documented in accordance with organisation requirements and faulty or replaced equipment is tagged and dispatched to maintain equipment spares.                            |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and decommissioning electrical and electro-mechanical signalling from service. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.2 Enterprise work activities records
- 2.4.11 Personal computers, hardware basic
- 2.4.16 Personal computers, engineering applications software basic
- 2.4.13 Computer peripherals
- 2.5.4 Technical standards, regulations and codes rail networks
- 2.5.10 Technical manuals and catalogues
- 2.9.3.2 Inverters
- 2.9.3.3 Electronic switching
- 2.9.11
  - Linear and switch mode power supplies
- 2.10.1.1 Electronic communications, principles
- 2.14.6 Rail signalling, electronic equipment
- 2.14.7 Rail signalling, computer-based equipment
- 2.14.8 Rail signalling, computer applications
- 2.14.10 Rail signalling, remote control systems
- 2.14.11.1 Rail signalling interlocking systems, electrical
- 2.14.11.2 Rail signalling interlocking systems, mechanical
- 2.14.12 Rail signalling, power supplies
- 2.14.14 Rail signalling, drawings and diagrams
- 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.5 Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State or Territory codes of practice and safe working requirements
- Equipment relevant to a particular rail network
- Code of practice for Defined Interstate Rail Networks

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its

‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Decommission electrical and electro-mechanical signalling from service as described in 7) and including:
    - A Reading and interpreting specifications correctly
    - B Disconnecting signalling circuits, equipment and components to meet operational and technical standards
    - C Using effective fault diagnosis and repair/replacement techniques to specified model level
    - D Confirming circuits, equipment and components operated within specified technical parameters

- E Testing equipment and instruments
- F Using tools correctly
- G Following relevant codes of practice, environmental protection procedures and requirements
- H Completing relevant records and documentation
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in decommissioning electrical and electro-mechanical signalling from service.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 4.2; 5.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 3.2	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5; 3.2 to 3.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.2; 4.2	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills

enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.5; 1.6; 2.2 to 2.4; 3.2; 3.3; 4.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.4

## UEENEEN028A Test and commission power signalling equipment

### Unit Descriptor

1)

This unit covers the testing and commissioning of power signalling equipment into service on rail networks. It encompasses safe working, regulatory requirement work procedures, connection of wiring circuitry, equipment and components, testing of wiring circuitry, equipment and components, finding and repairing faults, testing of control and indicating equipment and reporting.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the relevant workplace requirements in ‘Work site protection’ have been acquired.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit shall apply to qualifications in installation and maintenance of rail signalling electrical power and control systems.

### Licence to practise

3.1)

The skills and knowledge described in this unit may only be practised in the workplace under the codes of practice and regulations of the State/Territory for which the work is carried out. This includes the ‘Code of Practice for the Define Interstate Rail Network’ for work carried out on that network.

### Competency Field

4)

Rail

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to test and commission power signalling circuits, equipment and components.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of testing and commissioning is determined from job specifications, design drawings and regulatory requirements.</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.5 Materials needed for the testing and commissioning of power signalling circuits, equipment and components are obtained in accordance with established procedures and checked against job requirements.</p> <p>1.6 Tools, equipment and testing devices needed to test and commission power signalling circuits, equipment and components are obtained in accordance with established procedures and checked for correct operation and safety.</p>
2. Perform testing and commissioning of power signalling circuits, equipment and components	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Where applicable on-track safety requirements are complied with to enterprise standards</p> <p>2.3 Visual inspection is carried out and all circuits, equipment and components are checked to ensure they are in accordance with manufacturers and systems specifications.</p> <p>2.4 Testing and commissioning work includes the installation, termination and operation of the equipment, checking and adjusting levels and checking indicators and system operation is carried out to organisation requirements.</p> <p>2.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p>

- 2.6 Testing and commissioning is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3. Find and repair faults.
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 System and design faults are verified using appropriate technical information, fault finding and diagnostic techniques to identify faulty wiring, equipment and components
  - 3.3 Identified irregularities and non-conforming wiring, equipment or components are documented and immediate follow up action is initiated to ensure all faults are rectified
  - 3.4 Faulty signalling equipment is replaced, adjusted and secured in accordance with manufacturer specifications and organisation procedures.
  - 3.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
  - 3.6 Fault finding and repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 4. Finalise testing and commissioning work.
  - 4.1 OHS work completion risk control measures and procedures are followed.
  - 4.2 Test results are documented in accordance with organisation requirements and faulty or replaced equipment is tagged and dispatched to maintain equipment spares.
  - 4.3 Fully operational equipment is handed over to approved personnel ensuring that hand over procedures are accurately followed and final documentation is completed

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and testing and commissioning power signalling equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

2.2.2 Enterprise work activities records

- 2.4.11 Personal computers, hardware basic
- 2.4.13 Computer peripherals
- 2.4.16 Personal computers, engineering applications software basic
- 2.5.4 Technical standards, regulations and codes rail networks
- 2.5.10 Technical manuals and catalogues
- 2.9.3.2 Inverters
- 2.9.3.3 Electronic switching
- 2.9.11
  - Linear and switch mode power supplies
- 2.10.1.1 Electronic communications, principles
- 2.14.6 Rail signalling, electronic equipment
- 2.14.7 Rail signalling, computer-based equipment
- 2.14.8 Rail signalling, computer applications
- 2.14.10 Rail signalling, remote control systems
- 2.14.11.1 Rail signalling interlocking systems, electrical
- 2.14.11.2 Rail signalling interlocking systems, mechanical
- 2.14.12 Rail signalling, power supplies
- 2.14.14 Rail signalling, drawings and diagrams
- 2.14.15 Rail signalling, regulations and codes
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.5 Rail safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- The relevant State or Territory codes of practice and safe working requirements
- Equipment relevant to a particular rail network

- Code of practice for Defined Interstate Rail Networks

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Section 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

---

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Test and commission power signalling equipment as described in 7) and including:
    - A Reading and interpreting specifications correctly
    - B Testing and commissioning signalling circuits, equipment and components to meet operational and technical standards
    - C Using effective fault diagnosis and repair/replacement techniques to specified model level
    - D Confirming circuits, equipment and components operated within specified technical parameters
    - E Testing equipment and instruments
    - F Using tools correctly
    - G Following relevant codes of practice, environmental protection procedures and requirements
    - H Completing relevant records and documentation
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in testing and commissioning power signalling equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 5.2; 5.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 3.2	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5; 3.2 to 3.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.2; 4.2	2

### **Skills Enabling Employment**

#### **8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.5; 1.6; 2.2 to 2.4; 3.2; 3.3; 4.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 3.4



**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1J  
J – Refrigeration and A/C Units**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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UEENEEJ025A .....	2
Commission complex refrigeration systems .....	2
UEENEEJ026A .....	2
Commission complex control systems for refrigeration/air conditioning .....	2
UEENEEJ027A .....	2
Determine thermodynamic parameters of refrigeration and air conditioning systems.....	2
UEENEEJ028A .....	2
Produce HVAC/R design drawings.....	2
UEENEEJ029A .....	2
Determine the heat loads for commercial refrigeration and air conditioning applications .....	2
UEENEEJ030A .....	2
Produce HVAC/R control system design diagrams .....	2
UEENEEJ031A .....	2
Provide solutions to vibration problems in HVAC/R system design .....	2
UEENEEJ032A .....	2
Design commercial refrigeration systems .....	2
UEENEEJ033A .....	2
Design industrial refrigeration systems .....	2
UEENEEJ034A .....	2
Design heating, ventilation and air conditioning (HVAC) systems .....	2
UEENEEJ035A .....	2
Design control systems for a heating, ventilation, air conditioning or refrigeration system.....	2
UEENEEJ036A .....	2
Evaluate and report on energy management .....	2
UEENEEJ037A .....	2
Evaluate and report on air quality in buildings .....	2
UEENEEJ038A .....	2
Analyse noise and vibration in refrigeration and air conditioning systems .....	2
UEENEEJ039A .....	2
Develop specifications and prepare drawings for HVAC/R projects.....	2
UEENEEJ040A .....	2
Manage refrigeration and air conditioning projects .....	2
UEENEEJ041A .....	2
Design complex commercial refrigeration system .....	2
UEENEEJ042A .....	2
Design complex industrial refrigeration systems .....	2
UEENEEJ043A .....	2
Design complex air conditioning systems.....	2
UEENEEJ044A .....	2

Design mechanical ventilation/exhaust systems .....	2
UEENEEJ045A.....	2
Design hydronic systems .....	2
UEENEEJ046A.....	2
Design complex control systems for heating, ventilation, air conditioning or refrigeration systems.....	2
UEENEEJ047A.....	2
Audit energy use for commercial HVAC/R systems .....	2
UEENEEJ048A.....	2
Audit HVAC/R control systems for compliance with standards and regulations.....	2
UEENEEJ049A.....	2
Develop specifications for heat exchanger designs.....	2
UEENEEJ050A.....	2
Evaluate alternative and new technologies applicable to electrotechnology applications .....	2
UEENEEJ051A.....	2
Service small appliances and power tools.....	2
UEENEEJ052A.....	2
Carry out repairs to appliance refrigeration systems.....	2
UEENEEJ053A.....	2
Find and rectify faults in appliance motors and associated controls.....	2
UEENEEJ054A.....	2
Find and rectify faults in appliance control devices and systems .....	2
UEENEEJ055A.....	2
Service refrigerated appliances .....	2
UEENEEJ056A.....	2
Service clothes washers and dryers.....	2
UEENEEJ057A.....	2
Service electric heating appliances .....	2
UEENEEJ058A.....	2
Service dish washing machines.....	2
UEENEEJ059A.....	2
Service gas appliances .....	2
UEENEEJ060A.....	2
Service room air conditioners .....	2
UEENEEJ061A.....	2
Verify compliance and functionality of appliances.....	2
UEENEEJ062A.....	2
Recover, pressure and leak test, evacuate and charge refrigerants — appliances.....	2
UEENEEJ063A.....	2
Analyse the psychrometric and thermodynamic performance of HVAC/R systems.....	2
UEENEEJ064A.....	2
Analyse the operation of HVAC/R systems.....	2
UEENEEJ065A.....	2
Evaluate fluid and thermodynamic parameters of refrigeration systems .....	2
UEENEEJ066A.....	2

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Solve problems in dairy refrigeration systems .....	2
UEENEEJ067A .....	2
Solve problems in central plant air conditioning systems .....	2
UEENEEJ068A .....	2
Maintain microbial control of air and water systems .....	2
UEENEEJ069A .....	2
Plan refrigeration and air conditioning projects .....	2
UEENEEJ070A .....	2
Diagnose and rectify faults in refrigeration and air conditioning control systems.....	2
UEENEEJ071A .....	2
Solve problems in refrigerated beverage vending cabinets .....	2
UEENEEJ072A .....	2
Recover, pressure and leak test, evacuate and charge refrigerants — split air conditioning systems .....	2
UEENEEJ073A .....	2
Service microwave ovens .....	2

## UEENEEJ002A Prepare refrigerant tubing and fittings

### Unit Descriptor

1)

This unit covers the basic connection of refrigeration and air conditioning piping/tubing and fittings. It encompasses the safe use of hand, fixed and portable power tools for cutting, flaring, bending, swaging, silver brazing copper tube to copper tube, Bundy tube and brass and steel fittings, measurement and reading drawings and diagrams.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components.

UEENEEE007A Use drawings, diagrams, schedules and manuals

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also be used to augment previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit may, in some jurisdictions, require a licence to practise in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to fabricate tubing and attach fittings for refrigeration and/or air conditioning systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.
- 1.4 The nature of work is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established routines and procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Fabricate tubing and attach fittings for refrigeration and/or air conditioning systems

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Work in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Established methods used to cut, flare, swage, bend, silver braze tubing and fittings as they apply to the refrigeration/air conditioning equipment arrangements.

	2.4	Refrigerant tubing and fittings are silver brazed with the use of dry nitrogen to prevent contamination.
	2.5	Fabricate tubing and attach fittings are prepared efficiently without waste of materials or damage/contamination to apparatus and the surrounding environment or services and using sustainable energy practices.
	2.6	Routine quality checks are carried out in accordance with work instructions/or specifications including dimensions, routes, and locations.
3	Complete work and report	3.1 OHS work completion risk control measures and procedures are followed.
		3.2 Work site is cleaned and made safe in accordance with established procedures.
		3.3 Work supervisor is notified of the completion of the work in accordance with established procedures.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and preparing refrigerant tubing and fittings. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.11.13.1 Brazing and soldering equipment and techniques
- 2.11.14 Piping and tubing techniques
- 2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to preparing refrigerant tubing and fittings for at least two basic different refrigeration/air conditioning equipment layouts, which require cutting, flaring, bending, swaging, silver brazing copper tube to copper tube, Bundy tube, brass and steel fittings.

Note:

This includes piping/tubing and fittings for high pressure refrigerants.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

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#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Prepare refrigerant tubing and fittings as described in 7) and including:
    - A Applying tubing and fitting appropriately to equipment layout
    - B Using established methods to cut, flare, bend, swage and silver brazing copper tube
    - C Attaching fittings correctly
    - D Conducting component routine quality checks
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and  
specific  
resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice

**assessment** using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in preparing refrigerant tubing and fittings.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.3	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of	Refer to the following Performance Criteria for examples of application:

**UEENEEJ002A – Prepare refrigerant tubing and fittings**

	the context of the work task	1.3 to 1.7; 2.3 to 2.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEJ003A Determine the basic operating conditions of vapour compression systems**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the determination of the operating conditions of vapour compression systems. It encompasses working safely, determining refrigerant pressures and temperatures and relevant air and water temperatures using measurement and basic calculation methods.</p>						
<b>Prerequisite Unit(s)</b>	<b>2)</b>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEE002A Dismantle, assemble and fabricate electrotechnology components.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It is suitable for augmenting previously acquired competencies.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit may, in some jurisdictions, require a licence to practise in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p> <p>Note:</p> <p>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power</p>						

operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to determine the basic operating conditions of vapour compression systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
- 1.4 Expected operating conditions are obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
- 1.7 Tools, equipment and testing devices needed to determine the basic operating conditions are obtained and checked for correct operation and safety

2 Determine the basic operating conditions of vapour compression systems

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed
- 2.2 Measuring system operating parameters is conducted in strict accordance with OHS requirements and established safety procedures
- 2.3 System is checked and isolated where necessary, in strict accordance OHS requirements and procedures

- |   |                          |   |
|---|--------------------------|---|
|   | 2.4                      | Established procedures are used to determine actual and specified range of operating conditions from measured and calculated values as they apply to particular vapour compression systems. |
|   | 2.5                      | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.   |
|   | 2.6                      | Unexpected situations are dealt with safely and with the approval of an authorised person   |
|   | 2.7                      | Operating conditions are determined without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices                                   |
| 3 | Complete work and report | 3.1 OHS work completion risk control measures and procedures are followed   |
|   |                          | 3.2 Work site and equipment is cleaned and made safe in accordance with established procedures  |
|   |                          | 3.3 Operation conditions are documented, including identification of any parameter that is not within the specified range for the system  |
|   |                          | 3.4 Work supervisor is notified of the completion of the work in accordance with established procedures   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and determining the basic operating conditions of vapour compression systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.11.9.1 | Basic refrigeration testing and measuring field devices |
| 2.11.9.2 | Fitting and removing refrigeration service gauges       |
| 2.15.1   | Refrigeration compressors                               |
| 2.15.2   | Condensers  |
| 2.15.3   | Evaporators   |
| 2.17.1.1 | Refrigeration fundamentals                              |
| 2.17.1.2 | Basic refrigeration system operating conditions         |

- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to determining operating conditions using measurement and basic calculation methods of vapour compression systems whether used for refrigeration or air conditioning. These conditions include suction and discharge pressures, ambient, evaporator and condensing temperatures, evaporator, and condenser temperature difference.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Determine the basic operating conditions of vapour compression systems as described in 7) and including:
    - A Selecting and using appropriate measuring devices correctly
    - B Recording measurements
    - C Using calculation methods accurately
    - D Identifying the conditions of a refrigerant at various

locations in the vapour compression system

- E Documenting operating conditions correctly
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in determining the basic operating conditions of vapour compression systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	2

### **Skills Enabling Employment**

#### **8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.5; 1.5; 2.2 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## UEENEEJ004A Determine the basic operating conditions of air conditioning systems

### Unit Descriptor

1)

This unit covers the determination of basic operating conditions of air conditioning systems. It encompasses working safely, determining air temperature, air flow rates and relative humidity using measurement and basic calculation methods.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It is suitable for augmenting previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit may, in some jurisdictions, require a licence to practise in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to determine the basic operating conditions of air conditioning systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
- 1.4 Expected operating conditions are obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established routines and procedures
- 1.7 Tools, equipment and testing devices needed to determine the basic operating conditions are obtained and checked for correct operation and safety

2 Determine the basic operating conditions of air conditioning systems

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed
- 2.2 Measuring system operating parameters is conducted in strict accordance with OHS requirements and established safety procedures
- 2.3 System is checked and isolated where necessary, in strict accordance OHS requirements and procedures

- |   |                          |  |
|---|--------------------------|--|
|   | 2.4                      | Established procedures are used to determine actual and specified range of operating conditions from measured and calculated values as they apply to particular air conditioning systems |
|   | 2.5                      | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented   |
|   | 2.6                      | Unexpected situations are dealt with safely and with the approval of an authorised person  |
|   | 2.7                      | Operating conditions are determined without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices                                |
| 3 | Complete work and report | 3.1 OHS work completion risk control measures and procedures are followed  |
|   |                          | 3.2 Work site and equipment is cleaned and made safe in accordance with established procedures   |
|   |                          | 3.3 Operation conditions are documented, including identification of any parameter that is not within the specified range for the system   |
|   |                          | 3.4 Work supervisor is notified of the completion of the work in accordance with established procedures  |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and determining the basic operating conditions of air conditioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.11.10.1 Basic air conditioning measurement devices
- 2.17.4 Air conditioning fundamentals
- 2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to determining the basic operating conditions using measurement and basic calculation methods of air side components of air conditioning systems. These conditions include air dry and wet bulb temperatures, relative humidity, air

velocity and volume flow rates across a grille/register.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

---

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Determine the basic operating conditions of air conditioning systems as described in 7) and including:
    - A Selecting and using appropriate measuring devices correctly
    - B Interpreting measurements
    - C Using calculation methods accurately
    - D Identifying parameters not within the specified range
    - E Documenting operating conditions correctly
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in determining the basic operating conditions of air conditioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.4; 2.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.5; 1.5; 2.2 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## UEENEEJ005A **Position, assemble and start up split air conditioning systems**

### **Unit Descriptor**

**1)**

This unit covers the assembly, installation and starting up and de-commissioning of single head split air conditioning systems up to a maximum of 18kW<sub>r</sub> refrigeration capacity. It encompasses working safely and to standards, following routine procedures to install equipment, connecting pipe work, pressure testing, evacuating, perform functional checks and complete installation / regulatory documentation.

Note: The Ozone Protection and Synthetic Greenhouse Gas Legislation Amendment Bill 2003 may apply to this unit. Prior to planning the delivery of any training and/or assessment activities all legislative and regulatory requirements shall be identified and included.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ002A Prepare refrigeration tubing and fittings

UEENEEJ072A Recover, pressure and leak test, evacuate and charge refrigerants — split air conditioning systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also be used to augment previously acquired competencies.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit may, in some jurisdictions, require a licence to practise in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in workplace and during training

is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. The Ozone Protection and Synthetic Greenhouse Gas Legislation Amendment Bill 2003 may apply to this unit. Prior to planning the delivery of any training and/or assessment activities all legislative and regulatory requirements shall be identified and included.
2. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
3. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to assemble, install and start up split air conditioning systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented
- 1.4 The work is appropriately sequenced in accordance with job schedule
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.6 The layout of the pipe work to be installed is determined from job/manufacture specifications and diagrams
- 1.7 Materials needed to carry out the work are obtained in accordance with established procedures and checked against job requirements

- |   |   |      |   |
|---|---|------|---|
|   |   | 1.8  | Tools, equipment and testing devices needed to conduct the work are obtained in accordance with established procedures and checked for correct operation and safety                         |
|   |   | 1.9  | Appropriately licensed electrician is engaged to carry out all electrical work for the air conditioning system  |
|   |   | 1.10 | Preparatory work is checked to ensure no damage has occurred and complies with requirements.  |
| 2 | Assemble, install and start up split air conditioning systems     | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |   | 2.2  | System components are positioned in the specified location and assembled in strict accordance with manufacturer instructions and industry standards   |
|   |   | 2.3  | Interconnecting piping/tubing is prepared and assembled in strict accordance with manufacturer instructions and industry standards.   |
|   |   | 2.4  | Components are pressure tested and evacuated in strict accordance with manufacturer instructions and industry standards   |
|   |   | 2.5  | Established methods for dealing with unexpected situations are discussed with appropriate person or persons, documented are dealt with safely and with the approval of an authorised person |
|   |   | 2.6  | Ongoing checks of the quality of installation and start up are undertaken in accordance with established procedures   |
|   |   | 2.7  | Notification is given to appropriate person(s) that the system is ready for electrical connection in accordance with established procedures. (see note 1)                                   |
|   |   | 2.8  | The work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles            |
| 3 | Test single head wall split air conditioning systems and document | 3.1  | OHS risk control work completion measures and procedures are followed   |
|   |   | 3.2  | The system performance is tested to ensure compliance with technical standards, manufacturer/ job specifications and requirements (Note 2)  |

- 3.3 Work site and equipment is cleaned and made safe in accordance with established procedures. (Note 3)
- 3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures

Note.

1. Electrical connection shall be carried out by an appropriately licensed electrician.
2. Unit performance is completed after associated electrical work is carried out by an appropriate electrically licensed person.
3. Making safe includes leak testing and fitting of caps to all refrigerant access ports, which could allow refrigerant to escape into the environment. It includes de-commissioning.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and positioning, assembling and starting up split air conditioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.16.6 Split air conditioning system installation
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.2 Split air conditioning safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to the assembly, installation and starting up and de-commissioning of single head split air conditioning systems up to a maximum of 18kW 'refrigeration' capacity. It encompasses working safely and to standards, following routine procedures to install equipment, connect pipe work, pressure test, evacuate, perform functional checks and complete installation/regulatory documentation.

Note:

1. The Ozone Protection and Synthetic Greenhouse Gas Legislation Amendment Bill and the Ozone Protection and Synthetic Gas Management Regulations apply to this qualification. Prior to planning the delivery of any training and/or assessment activities all legislative and regulatory requirements shall be identified and included.
2. This includes the installation, commissioning and de-commissioning of single head wall hung split air conditioning systems. The maximum plant capacity for each system is 18 kW.
3. This unit DOES NOT COVER COMPETENCIES FOR service, repair, maintenance, diagnostic/fault finding and electrical work and the safe and proper installation of commercial refrigeration and air conditioning plant and equipment.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Position, assemble and start up split air conditioning systems as described in 7) and including:
    - A Determining job requirements correctly
    - B Positioning and assembling system components to specifications
    - C Assembling piping and tubing to specifications
    - D Pressure testing and evacuating the system in accordance with manufacturer's instructions and industry standards
    - E Giving notification to appropriate person for electrical connections to be completed
    - F Testing system performance correctly to manufacturer design specifications

- G Documenting work activities
- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in positioning, assembling and starting up split air conditioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 2.5; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.6 to 1.8	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 1.9; 2.7	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.9
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.10
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEJ006A Install pipe work for refrigeration and air conditioning systems

### Unit Descriptor

1)

This unit covers the installation, in buildings and premises, of refrigerant piping/tubing, fittings, flow controls, pressure sensing controls, and accessories for refrigeration and air conditioning systems. It encompasses working safely and to installation standards, routing pipe work to specified locations, connecting components and accessories and documenting installation work.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE005A Fix and secure equipment

UEENEEJ002A Prepare refrigeration tubing and fittings

UEENEEJ003A Determine the basic operating conditions of vapour compression systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It is suitable for augmenting previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit may, in some jurisdictions, require a licence to practise in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training

such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to install pipe work

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented
- 1.4 Pipe work installation is appropriately sequenced in accordance with job schedule
- 1.5 The nature and location of the work is determined from documentation or appropriate person(s) to establish the scope of work to be undertaken
- 1.6 Pipe work routes are planned within the constraints of the building structure, (heritage) significant, specifications and regulations
- 1.7 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.8 Materials needed install pipe work are obtained in accordance with established procedures and checked against job requirements
- 1.9 Tools, equipment and testing devices needed to install the pipe work are obtained in accordance with established procedures and checked for correct operation and safety

- |   |                                       |   |  |
|---|---------------------------------------|---|--|
|   | 1.10                                  | Preparatory work is checked to ensure no damage has occurred and complies with requirements |  |
| 2 | Install pipe work                     | 2.1   | OHS risk control measures and procedures for carrying out the work are followed  |
|   |                                       | 2.2   | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OH&S requirements and procedures  |
|   |                                       | 2.3   | Pipework and accessories are installed to comply with technical standards and job specifications and requirements with sufficient access to affect connections and maintenance                             |
|   |                                       | 2.4   | Accessories are installed straight and square in the required locations and within acceptable tolerances   |
|   |                                       | 2.5   | Refrigerant tubing and fittings are silver brazed with the use of dry nitrogen to prevent contamination  |
|   |                                       | 2.6   | Problematic situations that arise from the installation of the pipe work are dealt with in an appropriate manner.  |
|   |                                       | 2.7   | Ongoing checks of the quality of pipe work are undertaken including pressure testing and repair of leaks in accordance with the relevant technical standards and specifications and established procedures |
|   |                                       | 2.8   | Pipe work is installed efficiently without waste of materials, damage or contamination to apparatus and the surrounding environment or services and using sustainable energy practices                     |
| 3 | Completion of pipe work installation. | 3.1   | OHS risk control measures and procedures at the completion of work are followed  |
|   |                                       | 3.2   | Work site is cleaned and made safe in accordance with established procedures   |
|   |                                       | 3.3   | Final check of the installed pipe work is made to verify that it complies to all requirements  |
|   |                                       | 3.4   | ‘As-installed’ pipe work and accessories are documented and an appropriate person or persons notified in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing pipe work for refrigeration and air conditioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.3.5.1 Refrigerant pressure sensing controls
- 2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
- 2.15.1.4 Flow controls
- 2.16.1 Refrigeration pipe work and accessories
- 2.16.2 Refrigeration pipe work layout
- 2.16.3 Refrigeration installation requirements
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices
- 2.20.1 Sustainable energy principles
- 2.20.2 Environmental and heritage awareness

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to the installation of pipe work, for at least two different types of refrigeration and/or air conditioning systems.

The pipe work shall include suction lines, liquid lines, discharge lines, control lines and condensate drain lines. Accessories shall include pipe work fittings and flow controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### **Overview of Assessment**

- 8.1) Longitudinal competency development approaches to assessment,

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent

that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install pipe work for refrigeration and air conditioning systems as described in 7) and including:
    - A Reading and interpreting drawings related to pipe work layouts and apparatus locations
    - B Routing, placing and securing pipe work to comply with requirements
    - C Placing and securing accessories accurately
    - D Connecting pipe work and accessories to comply with requirements
    - E Cleaning pipe work of contaminants
    - F Ensuring pipe work will not leak under pressure
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in installing pipe work for refrigeration and air conditioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEE005A      Fix and secure equipment
- UEENEEJ002A      Prepare refrigerant tubing and fittings
- UEENEEJ003A      Determine the basic operating conditions of vapour compression systems
- UEENEEJ007A      Install refrigeration and air conditioning systems, major components and associated equipment

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.10	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.7; 2.3; 2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4 to 1.7

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.10
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 2.8

## **UEENEEJ007A Install refrigeration and air conditioning systems, major components and associated equipment**

### **Unit Descriptor**

**1)**

This unit covers the installation of unitary equipment, compressors, condensers, evaporators, liquid receivers, safety and cycling controls, ventilation and air handling (excluding central plant) and associated equipment. It encompasses working safely and to installation standards to match equipment with that specified for a given specification and location, connecting pipe work and components, and complete the necessary installation documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ006A     Install pipe work for refrigeration and air conditioning systems

UEENEEJ008A     Recover, pressure and leak test, evacuate and charge refrigerants

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training and may be used to augment other electrotechnology qualifications at AQF 3 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit may, in some jurisdictions, require a licence to practise in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in workplace and during training is also subject to regulations directly related to occupational

health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to install major components and associated equipment

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented
- 1.4 The nature and location of the work is determined from documentation or appropriate person(s) to establish the scope of work to be undertaken.
- 1.5 Component and equipment installation is appropriately sequenced in accordance with job schedule
- 1.6 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.7 Materials needed install pipe work are obtained in accordance with established procedures and checked against job requirements
- 1.8 Tools, equipment and testing devices needed to install the components and equipment are obtained in accordance with established procedures and checked for correct operation and safety

- |   |   |     |  |
|---|---|-----|--|
|   |   | 1.9 | Preparatory work is checked to ensure no damage has occurred and complies with requirements  |
| 2 | Install major components and associated equipment | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.   |
|   |   | 2.2 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures   |
|   |   | 2.3 | Components and equipment are installed to comply with technical standards, job specifications and requirements with sufficient access to affect electrical and pipe work connections and maintenance.        |
|   |   | 2.4 | Components and equipment are installed straight and square in the required locations and within acceptable tolerances.   |
|   |   | 2.5 | Refrigerant tubing and fittings are silver brazed with the use of dry nitrogen to prevent contamination.   |
|   |   | 2.6 | Problematic situations that arise from the installation of components and equipment are dealt with in an appropriate manner.   |
|   |   | 2.7 | Ongoing checks of the quality of pipe work are undertaken, including pressure testing and repair of leaks in accordance with the relevant technical standards and specifications and established procedures. |
|   |   | 2.8 | Components and equipment are installed efficiently without waste of materials or damage/contamination to apparatus and the surrounding environment or services and using sustainable energy practices.       |
| 3 | Complete installation.                            | 3.1 | OHS risk control measures and procedures at the completion of work are followed.   |
|   |   | 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
|   |   | 3.3 | Final check of the installed components and equipment is made to verify that it complies to all requirements   |
|   |   | 3.4 | ‘As-installed’ components and equipment is documented and an appropriate person or persons notified in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing refrigeration and air conditioning systems, major components and associated equipment. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.3.5.2 Refrigeration system control
- 2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
- 2.15.6 Fans and air distribution
- 2.15.24 Cool rooms and freezer rooms systems
- 2.15.25 Package air conditioning systems
- 2.15.26 Merchandising and display cabinets
- 2.15.27 Cooling towers, evaporative condensers, evaporative coolers and associated equipment
- 2.15.28 Residential air conditioning
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.18.3.1 Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to installing major components and associated equipment for at least 2 different types of refrigeration and/or air conditioning systems.

Major components shall include refrigeration compressors, condensers, condensing units, evaporators and liquid receivers.

Associated equipment shall include refrigerant flow controls, cycling controls, safety controls and isolation, monitoring and inspection accessories.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install refrigeration and air conditioning systems, major components and associated equipment as described in 7) and including:
    - A Reading and interpreting drawings related to pipe work layouts and apparatus locations.
    - B Placing aligning and securing components and equipment to comply with requirements
    - C Connecting components, equipment and pipe work to comply with requirements.
    - D Cleaning system of contaminants.
    - E Ensuring system will not leak under pressure.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in installing refrigeration and air conditioning systems, major components and associated equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEJ006A	Install pipe work for refrigeration and air conditioning systems
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**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6; 2.3; 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 2.8

## UEENEEJ008A Recover, pressure and leak test, evacuate and charge refrigerants

### Unit Descriptor

1)

This unit covers pressure and leak testing, evacuating, charging and recovery of refrigerants and lubricants from refrigeration systems and air conditioning systems. It encompasses working safely and to standards, following regulations and industry practices for handling refrigerants and lubricants, and completing the necessary documentation.

Note:

Refrigeration systems may be those used for refrigerating or for air conditioning.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ002A Prepare refrigeration tubing and fittings

UEENEEJ003A Determine the basic operating conditions of refrigeration and air conditioning systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training and may be used to augment other electrotechnology qualifications at AQF 3 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit may, in some States/Territories, require a licence to practise in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in workplace and during training is also subject to regulations directly related to

occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

- |  |   |
|--|---|
| <p>1 Prepare to recover refrigerants, pressure and leak test, evacuate and charge refrigeration systems.</p> | <p>1.1 OHS procedures including codes of practice for a given work area are obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed</p> <p>1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented</p> <p>1.4 The nature and location of the work is determined from documentation or appropriate person(s) to establish the scope of work to be undertaken</p> <p>1.5 The work is appropriately sequenced in accordance with job schedule</p> <p>1.6 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site</p> <p>1.7 Refrigerants, lubricants and cleaning materials needed for the work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.8 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety</p> |
|--|---|

- |  |      |  |
|--|------|--|
|  | 1.9  | Preparatory work is checked to ensure no damage has occurred and complies with requirements  |
| 2 Recover refrigerants, pressure and leak test, evacuate and charge refrigeration systems. | 2.1  | OHS risk control measures and procedures for carrying out the work are followed  |
|  | 2.2  | Checks are carried out to ensure the system or component parts are isolated, when necessary, in strict accordance with OHS requirements and procedures   |
|  | 2.3  | Circuits/machines/plant are checked as being electrically isolated where necessary in strict accordance OHS requirements and procedures  |
|  | 2.4  | The systems refrigerant and lubricant are tested for contamination   |
|  | 2.5  | Refrigerants are removed from a system safely into suitably labelled containers in accordance with regulatory requirements and industry practices, using appropriate recovery/reclaim equipment                                  |
|  | 2.6  | Precautions are taken to prevent damage to components while pressure testing the system  |
|  | 2.7  | Pressure testing is conducted at a pressure compatible with the refrigerant to be used   |
|  | 2.8  | Leaks are located and rectified using testing methods appropriate to the system under test and in accordance with industry practices   |
|  | 2.9  | Systems are evacuated to the required level and cleaned of all moisture and other containments in accordance with industry practices   |
|  | 2.10 | A 'Drop test' is used to prove effectiveness of the evacuation in accordance with industry practice  |
|  | 2.11 | The system, vacuum pump and recovery/reclaim unit lubricants are checked and maintained in accordance with manufacturer requirements   |
|  | 2.12 | Systems are charged or retrofitted with the appropriate refrigerant in accordance with manufacturer requirements and industry practices. This includes recording refrigerant usage in an auditable recording system, eg logbook. |
|  | 2.13 | Problematic situations that arise during the work are dealt with in an appropriate manner  |

	2.14	Systems are pressure and leak tested, evacuated and charged efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices
3 Complete and report refrigerants recovery, pressure and leak test and evacuate and charge work	3.1	OHS work completion risk control measures and procedures are followed
	3.2	Work site and equipment is cleaned and made safe in accordance with established procedures
	3.3	Contaminated refrigerant and lubricant is dealt with in accordance with legislative/regulatory requirements
	3.4	Completion of the work is documented and recorded, including refrigerant usage in an auditable logbook and an appropriate person or persons notified in accordance with established procedures

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and recovering, pressure and leak testing, evacuating and charging refrigerants. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.6	Technical standards, regulations and codes for refrigeration and air conditioning
2.11.9.3	Replacement of basic components on a refrigeration system
2.17.2.1	Refrigerants
2.17.2.4	High pressure refrigerants
2.17.2.5	Natural refrigerants
2.18.1	Occupational Health and Safety principles
2.18.3.1	Refrigeration and air conditioning safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to recovery, testing and charging refrigeration systems used for refrigeration or air conditioning encompassing the following:

- recovering refrigerant and lubricant from an existing system that may contain contaminants
- pressure and leak testing a newly installed or repaired system
- evacuating a system in preparation for charging with refrigerant
- selection of a suitable refrigerant and lubricant for a given application
- charging a system with refrigerant and lubricant with minimal loss

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Recover, pressure and leak test, evacuate and charge refrigerants and lubricants as described in 7) and including:
    - A Selecting appropriate materials and equipment
    - B Testing refrigerant and lubricant for contamination
    - C Removing and storing refrigerant correctly
    - D Conducting pressure testing at the appropriate pressure level and without damaging components

- E Locating and rectifying leaks
- F Decontaminating and evacuating the system to the required level
- G Charging the system with the appropriate refrigerant
- H Completing the necessary documentation
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in recovering, pressure and leak testing, evacuate and charging refrigerants.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEJ007A      Install refrigeration and air conditioning systems, major components and associated equipment

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.9	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.7; 2.12	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.11	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance.

See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4 to 2.9
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.12

## **UEENEEJ009A      Verify compliance and functionality of refrigeration and air conditioning installations**

### **Unit Descriptor**

1)

This unit covers testing and visual inspection for verifying that a refrigeration and air conditioning system and components are safe, comply with requirements and functions as intended. It encompasses working safely, conducting compliance tests, conducting visual inspections, identifying non-compliance defects and mandatory reporting requirements.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEE001A	Apply OHS practices in the workplace
UEENEEE002A	Dismantle, assemble and fabricate electrotechnology components
UEENEEE003A	Solve problems in extra-low voltage single path circuits
UEENEEE005A	Fix and secure equipment
UEENEEE007A	Use drawings, diagrams, schedules and manuals
UEENEEE037A	Document occupational hazards and risks in electrotechnology
UEENEEE038A	Participate in development and follow a personal competency development plan
UEENEEJ002A	Prepare refrigeration tubing and fittings
UEENEEJ003A	Determine the basic operating conditions of vapour compression systems
UEENEEJ004A	Determine the basic operating conditions of air conditioning systems
UEENEEJ006A	Install pipe work for refrigeration and air conditioning systems

UEENEEJ007A	Install refrigeration and air conditioning systems, major components and associated equipment
UEENEEJ008A	Recover, pressure and leak test, evacuate and charge refrigerants
UEENEEJ010A	Select refrigerant pipe/tube, accessories and associated controls
UEENEEJ011A	Diagnose and rectify faults in refrigeration and air conditioning systems and components
UEENEEJ013A	Commission refrigeration and air conditioning systems
UEENEEJ036A	Evaluate and report on energy management
UEENEEJ070A	Diagnose and rectify faults in refrigeration and air conditioning control systems
UEENEEP001A	Disconnect and reconnect fixed wired electrical equipment connected to a Low Voltage supply
UEENEEP002A	Attach cords and plugs to electrical equipment for connection to a single phase 250 Volt supply
UEENEEP003A	Attach cords and plugs to electrical equipment for connection to 1000 Va.c. or 1500 Vd.c. supply
UEENEEP007A	Locate and rectify faults in electrical low voltage equipment following prescribed procedures

Elective units to a Unit Strand Total of at least 5 from Schedule 3.

**Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading      3      Writing      3      Numeracy      3

**Application of the Unit 3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to verify refrigeration and air conditioning installations

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.5 Location of system components is determined from specifications and diagrams
- 1.6 Inspection and tests are appropriately sequenced in accordance with job schedule

	1.7	Materials needed for the tests and verification are obtained in accordance with established procedures and checked against job requirements
	1.8	Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety
Visually inspect the installation	2.1	OHS risk control measures and procedures for carrying out the work are followed
	2.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
	2.3	Pipe work is checked for appropriate type and size
	2.4	Pipe work, accessories and components are validated as being suitably located, securely fixed and suitably protected from damage or corrosion
	2.5	System components and accessories are validated as being appropriately rated per manufacture and design specifications
	2.6	Evidence that equipment complies with safety and functional requirements is cited
	2.7	Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented
	2.8	Unexpected situations are dealt with safely and with the approval of an authorised person
	2.9	Inspection is carried out efficiently without waste of materials, damage to, or contamination of apparatus and the surrounding environment or services and using sustainable energy practices
2 Conduct tests	3.1	OHS risk control measures and procedures for carrying out the work are followed
	3.2	Testing or measuring on a live and operating system in strict accordance with OHS requirements and within established safety procedures
	3.3	Circuits/machines/plant are checked as being isolated in strict accordance OHS requirements and procedures

- |   |   |   |
|---|---|---|
|   | 3.4   | Electrical tests are conducted to verify that the electrical circuit within the refrigeration installation are safe and function as intended                            |
|   | 3.5   | Refrigeration tests are conducted to verify that the refrigeration equipment and pipe work within the refrigeration installation is safe and functions as intended      |
|   | 3.6   | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented  |
|   | 3.7   | Unexpected situations are dealt with safely and with the approval of an authorised person   |
|   | 3.8   | Testing is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices |
| 4 | Report inspection and verification findings |   |
|   | 4.1   | OHS work completion risk control measures and procedures are followed   |
|   | 4.2   | Work site and equipment is cleaned and made safe in accordance with established procedures  |
|   | 4.3   | Non-compliance defects are identified and reported in accordance with established procedures  |
|   | 4.4   | Recommendations for rectifying defects are made in accordance with established procedures   |
|   | 4.5   | Work completion is documented and an appropriate person or persons notified in accordance with established procedures   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying compliance and functionality of refrigeration and air conditioning installations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |  |
|----------|--|
| 2.16.5   | Refrigeration and air conditioning installations, testing and verification methods |
| 2.18.1   | Occupational Health and Safety principles  |
| 2.18.2   | Electrical Safe working practices  |
| 2.18.3.1 | Refrigeration and air conditioning safe working                                    |

practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to at least two different new or existing refrigeration and air conditioning installations. Verification shall include:

- Visual inspection of the system, its components pipe work controls and accessories
- Conducting all electrical tests

Note:

1. Electrical testing include isolation testing; insulation resistance of equipment; resistance of the internal circuits of equipment; polarity of supply and equipment; continuity of earthing; correct electrical connections load current.  
2. Electrical testing may be limited by the scope permitted under restricted electrical work

- Conducting all refrigeration tests

Note:

Refrigeration testing includes pressure test apparatus/circuits; leak test apparatus/circuits; evacuation test apparatus/circuits; compressor efficiency; controls tests; refrigerant charge; operating pressures; system operation system capacity

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Verify compliance and functionality of refrigeration and air conditioning installations as described in 7) and including:
  - A Identifying visual defects
  - B Conducting all electrical tests safely and correctly
  - C Conducting all refrigeration tests safely and correctly
  - D Identifying non-compliant defects from test results
  - E Recommending appropriate corrective actions
  - F Acting within regulatory limits
  - G Reporting legibly and accurately
  - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in verifying compliance and functionality of refrigeration and air conditioning installations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.3 to 2.6; 3.4; 3.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 3.4; 3.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 4.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 3.4; 3.5	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.2 to 1.8; 2.1; 3.1; 3.2

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 2.8; 3.7; 3.8

## **UEENEEJ010A      Select refrigerant pipe/tube, accessories and associated controls**

### **Unit Descriptor**

**1)**

This unit covers the selection of refrigerant pipe/tube, accessories and controls for refrigeration and air conditioning installations to comply with regulations, standards and specifications. It encompasses developing pipe work arrangements, selecting pipe work and fittings, refrigeration flow controls and accessories, and mechanical and electrical control devices based on specifications, standards and manufacturer catalogues to determine calculated and deemed-to-comply solutions and documenting all selection information.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ003A      Determine the basic operating conditions of refrigeration and air conditioning systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It is suitable for augmenting previously acquired competencies.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to select pipe/tube, accessories and controls

- 1.1 The extent and nature of the refrigeration installation is determined from job specifications.
- 1.2 Safety and other regulatory requirements to which the refrigeration system shall comply, are identified, obtained and understood

2 Develop pipe work arrangements

- 2.1 The intended location of refrigeration equipment is determined from job specifications and site drawings or deemed to comply arrangements.
- 2.2 Pipe work arranged to ensure safe and functional operation of the system.
- 2.3 Pipe work is arranged to comply with technical standards and job specifications and requirements.

3 Select pipe/tube, accessories and controls

- 3.1 Pipe and tubing is selected for suitability for the environments in which it is to be installed
- 3.2 Pipe and tubing is sized to meet refrigeration parameters and capacity requirements for the refrigerant to be used.

- 3.3 Pipe and tubing quantities are determined from equipment location diagrams and job specifications.
  - 3.4 Refrigeration controls and accessories are selected to meet load requirements based on calculated or deemed-to-comply solutions.
  - 3.5 Control devices are selected to meet functional, specified and regulatory requirements.
  - 3.6 Electrical control devices are selected to meet current, voltage and IP ratings.
  - 3.7 Evidence is obtained that the selected refrigeration equipment and control devices comply with all requirements.
- 4 Document electrical installation
- 4.1 Reasons for selections made, including calculations, are documented in accordance with established procedures.
  - 4.2 Refrigeration installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and selecting refrigerant pipe/tube, accessories and associated controls. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.1 Enterprise communication methods
- 2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
- 2.15.4.2 Refrigerant control selection
- 2.16.1 Refrigeration pipe work and accessories
- 2.16.2 Refrigeration pipe work layout
- 2.16.3 Refrigeration installations, equipment requirements
- 2.16.4 Refrigeration pipe selection and sizing
- 2.17.3.1 Refrigeration system capacity control
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to the selection of refrigerant pipe/tube, accessories and associated controls for two different refrigeration systems. These include the following; refrigerant pipe (quick selection method) and fittings, refrigeration flow controls, isolation/access valves, filter-dryers, sight glasses, accessories, thermostats, pressure controls and humidity controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently

practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Select refrigerant pipe/tube, accessories and associated controls as described in 7) and including:
    - A Arranging pipe work to comply with regulatory and functional requirements.
    - B Selecting appropriate type, size and quantity of pipe and tubing
    - C Selecting refrigeration accessories that meets load requirements
    - D Selecting control devices that meet functional and regulatory requirements.

- E Documenting pipe work arrangement, specification for items selected and reasons for the selections made
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in selecting refrigerant pipe/tube, accessories and associated controls.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED001A Use basic computer applications’

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 3.1 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: (See Note)	1

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENED001A Use basic computer applications'

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEJ011A      Diagnose and rectify faults in refrigeration and air conditioning systems and components**

### **Unit Descriptor**

**1)**

This unit covers diagnosing, repairing faults and replacing faulty components in refrigeration and air conditioning systems, components, interconnecting circuits and equipment operating at voltages up to 1,000 V a.c. It encompasses working safely, reading electrical circuit diagrams, refrigeration, hydronic and air distribution system diagrams and manufacturers reference material, sketching diagrams from traced wiring and piping systems, applying logical fault finding procedures, conducting repairs, replacing components and completing the necessary service documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ007A	Install refrigeration and air conditioning systems, major components and associated equipment
UEENEEJ070A	Diagnose and rectify faults in refrigeration and air conditioning control systems
UEENEEP007A	Locate and rectify faults in electrical low voltage equipment following prescribed procedures

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and rectify faults

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The nature of the fault is obtained from documentation and/or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety

- |   |              |     |   |
|---|--------------|-----|---|
| 2 | Find faults  | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |              | 2.2 | The need to test or measure live and operating system is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures  |
|   |              | 2.3 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures  |
|   |              | 2.4 | Fault finding is approached methodically drawing on knowledge of refrigeration and air conditioning systems using observation, measurement, calculations and comparison with normal system and component parameters/values. |
|   |              | 2.5 | Faults beyond the scope of refrigeration and air conditioning work are identified.  |
|   |              | 2.6 | System components are removed/dismantled where necessary and parts stored to protect them against loss or damage  |
|   |              | 2.7 | Faulty components are rechecked and their fault status confirmed.   |
|   |              | 2.8 | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |              | 2.9 | Fault finding activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.   |
| 3 | Repair fault | 3.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |              | 3.2 | Arrangements are made for appropriately competent and authorised person to rectify faults that are beyond the scope of refrigeration and air conditioning work.   |
|   |              | 3.3 | Equipment is checked as being isolated where necessary in strict accordance OHS requirements and procedures   |
|   |              | 3.4 | Materials required to rectify faults are sourced and obtained in accordance with established procedures.  |

	3.5	Repairs are affected efficiently without damage to other components or apparatus and using sustainable energy principles.	
	3.6	Effectiveness of the repair is tested in accordance with established procedures.	
	3.7	System is reassembled and finally tested to ensure it is operating safely, effectively and complies with relevant requirements.	
4	Completion and report fault finding and rectification activities	4.1	OHS work completion risk control measures and procedures are followed.
		4.2	Work area is cleaned and made safe in accordance with established procedures.
		4.3	Written justification is made for repairs to circuits/apparatus.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in refrigeration and air conditioning systems and components. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.15.9.1	Appliance refrigerated systems
2.15.29	Servicing refrigeration and air conditioning systems
2.18.1	Occupational Health and Safety principles
2.18.3.1	Refrigeration and air conditioning safe working practices

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to diagnosing and rectifying faults in the following refrigeration air conditioning systems and components:

- Compressors
- Condensers
- Evaporators/cooling coils
- Refrigerant flow controls
- Refrigerant piping and accessories
- Refrigeration systems
- Cycling controls
- Safety controls
- Motors

At least one of the following apparatus:

- Water systems, which includes cooling towers, evaporative condensers, evaporative coolers, hot water systems, chilled water systems, pumps, piping and associated equipment
- Air distribution systems

At least three of the following systems

- cool rooms
- freezer rooms
- merchandising and display cabinets
- residential air conditioning systems
- packaged or commercial air conditioning systems
- industrial air conditioning systems
- domestic refrigerators and freezers

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in refrigeration and air conditioning systems and components as described in 7) and including:
    - A Using methodical fault finding techniques
    - B Finding faults efficiently
    - C Rectifying faults without damage
    - D Providing written justification for the rectifications undertaken
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

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**Context of and  
specific  
resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice

**assessment** using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in diagnosing and rectifying faults in refrigeration and air conditioning systems and components.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEJ013A Commission refrigeration and air conditioning systems

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.6; 2.7	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	2.6; 3.6; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 2.4 to 2.7; 3.2 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.8

## **UEENEEJ012A      Diagnose and rectify faults in complex refrigeration/air conditioning systems**

### **Unit Descriptor**

**1)**

This unit covers diagnosing and rectifying faults in complex refrigeration/air conditioning systems. It encompasses safe working practices, interpreting technical data, applying knowledge of complex refrigeration/air conditioning systems operating parameters to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ009A      Verify compliance and functionality of refrigeration and air conditioning installations

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      4      Writing      4      Numeracy      4

### **Application of the Unit**

**3)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 4 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Logical diagnostic methods are applied to diagnose complex refrigeration/air conditioning systems faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
- 2.5 Suspected fault scenarios are tested as being the source of system problems.
- 2.6 Causes of the faults are identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the refrigeration and air-conditioning system.
- 2.7 Faults in system components of the system are rectified to raise the refrigeration/air conditioning systems to its operation standard.
- 2.8 System is tested to verify that the system operates as intended and to specified requirements.
- 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
- 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 2.11 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Complete and report fault diagnosis and rectification activities.
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is made safe in accordance with established safety procedures.
  - 3.3 Rectification of faults is documented in accordance with established procedures.
  - 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in complex refrigeration/air conditioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.3	Fault finding techniques
2.3.5	Refrigeration controls
2.3.6	Air conditioning controls
2.17.13	Refrigeration system analysis
2.18.1	Occupational Health and Safety principles
2.18.3.1	Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to diagnosing and rectifying at least four faults in complex refrigeration/air conditioning systems, incorporating multiple major components (i.e. compressors, condenser or evaporators) circuits or systems and associated components and controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to

include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in complex refrigeration/air conditioning systems as described in 7) and including:
    - A Applying logical diagnostic methods
    - B Using fault scenarios to test the cause of system faults
    - C Identifying faults and competency needed to rectify them
    - D Rectifying faults in system controls
    - E Verifying that the system operates correctly
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in diagnosing and rectifying faults in complex refrigeration/air conditioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and

incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## **UEENEEJ013A Commission refrigeration and air conditioning systems**

### **Unit Descriptor**

**1)**

This unit covers commissioning of refrigeration and air conditioning systems. It encompasses working safely and to standards to commission the whole system and includes pre-commissioning tests, starting up the system, optimizing the refrigerant charge, basic air and water balancing and adjustment, checking and adjusting components and controls to ensure its efficient and balanced operation, and completing commissioning documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ007A	Install refrigeration and air conditioning systems, major components and associated equipment
UEENEEJ070A	Diagnose and rectify faults in refrigeration and air conditioning control systems
UEENEEP007A	Locate and rectify faults in electrical low voltage equipment following prescribed procedures

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to commission refrigeration and air conditioning systems

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Commissioning work is appropriately sequenced in accordance with job schedule
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.6 The extent of the system and location of system components is determined from site inspection and/or job specifications and diagrams
- 1.7 System control setting and operating parameters are determined from job specifications and requirements.

- 1.8 Tools, equipment and testing devices needed to commission the system are obtained in accordance with established procedures and checked for correct operation and safety
- 1.9 Pre commissioning checks are undertaken to ensure all components are in place and secure.
- 1.10 The need to test or measure a live and operating system is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2 Commission refrigeration systems
  - 2.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
  - 2.3 Refrigeration system pressure controls, valves and regulators are adjusted to their required settings.
  - 2.4 Testing/measuring devices are used to observe the operation of refrigeration system and fine adjustments of controls are made as necessary.
  - 2.5 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
  - 2.6 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.7 Commissioning is conducted efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 3 Commission air handling systems
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
  - 3.3 Air distribution system dampers are adjusted to avoid air restrictions and allow maximum return volumes.

- 3.4 Balancing the air distribution system is carried out methodically drawing on knowledge of air distribution requirements using measured and calculated values of system parameters.
- 3.5 Air distribution system is balanced to ensure the flow rates meet the specified requirements for each outlet.
- 3.6 Testing/measuring devices are used to observe the operation of air conditioning system components and fine adjustments of controls are made as necessary.
- 3.7 Testing/measuring devices are used to observe the operation of refrigeration system and fine adjustments of controls are made as necessary.
- Note:  
Components can include fans, chillers, condensers, coils and heat exchangers, boilers and controls
- 3.8 Testing/measuring devices are used to observe the operation of the hydronic system and fine adjustments of controls are made as necessary.
- Note:  
Components can include chillers, condensers, coils and heat exchangers, boilers, cooling towers, pumps and controls
- 3.9 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
- 3.10 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 3.11 Commissioning is conducted efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
- 4 Complete and document commissioning work
- 4.1 OHS work completion risk control measures and procedures are followed.
- 4.2 Work site is cleaned and made safe in accordance with established procedures.
- 4.3 Results of commissioning are documented including final operating parameters and an appropriate person or persons notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and commissioning refrigeration and air conditioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2 Enterprise communication methods
- 2.11.10.2 Air conditioning testing devices
- 2.15.30 Commissioning refrigeration and air conditioning systems
- 2.16.17 Retrofitting refrigeration systems
- 2.17.3 Refrigeration systems and compressor operations
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to commissioning the following refrigeration and air conditioning systems and components:

- Compressors
- Condensers
- Evaporators/cooling coils
- Refrigerant flow controls
- Refrigerant piping and accessories
- Refrigeration systems
- Cycling controls
- Safety controls
- Motors

At least one of the following apparatus:

- Water systems, which includes cooling towers, evaporative condensers, evaporative coolers, hot water systems, chilled water systems, pumps, piping and associated equipment
- Air distribution systems

At least three of the following systems

- cool rooms
- freezer rooms
- merchandising and display cabinets
- residential air conditioning systems
- packaged or commercial air conditioning systems
- industrial air conditioning systems
- domestic refrigerators and freezers

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most

effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Commission refrigeration and air conditioning systems and components as described in 7) and including:

- A Using methodical commissioning techniques
- B Commissioning efficiently
- C Optimising system performance and efficiency
- D Providing written commissioning reports
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in commissioning refrigeration and air conditioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.8	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## UEENEEJ014A Solve problems in hydronic systems

### Unit Descriptor

1)

This unit covers solving problems in hydronic systems. It encompasses working safely and to standards, applying knowledge of the components and solving problems in hydronic systems, using effective problem solving techniques and documenting solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ011A Diagnose and rectify faults in refrigeration and air conditioning systems and components

UEENEEJ013A Commission refrigeration and air conditioning systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

### Application of the Unit

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to solve problems in hydronic systems

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve problems in hydronic systems

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures

- 2.4 Problems are approached methodically drawing on operational knowledge of hydronic systems using observation, measurement, calculations and comparison with normal operating values of system and components.
- 2.5 Information needed to solve problems is gathered and evaluated against normal operating parameters.
  - Note:  
Examples of information needed to solve problems are system specifications, as-installed drawings, maintenance and service records and measured and calculated values of component operating parameters.
- 2.6 Problems are dealt with safely and with the approval of an authorised person.
- 2.7 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Complete work and document problem solving activities in hydronic systems
  - 3.1 OHS risk control work completion measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Justification for solutions used to solve problems is documented
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in hydronic systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.6 Hydronic systems
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in solving at least three operational problem related to

hydronic systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in hydronic systems as described in 7) and including:
    - A Using methodical fault finding techniques
    - B Assessing relevant information
    - C Solving problems effectively
    - D Providing written justification for the solutions used
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

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**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in solving problems in hydronic systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEJ011A	Diagnose and rectify faults in refrigeration and air conditioning systems and components
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**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.6; 2.4; 3.4; 3.6	2

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.10	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.4 to 3.7	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.4; 3.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.3 to 3.7	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.3 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.10
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6; 3.8; 3.9

## UEENEEJ015A Solve problems in beverage dispensers

### Unit Descriptor

1)

This unit covers solving problems in beverage dispensers. It encompasses working safely and to standards, applying knowledge of the components and operation of beverage dispensers, using effective problem solving techniques and documenting solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ011A Diagnose and rectify faults in refrigeration and air conditioning components and systems

UEENEEJ013A Commission refrigeration and air conditioning systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

#### Competency Field 4)

#### Refrigeration and Air Conditioning

#### ELEMENT

#### PERFORMANCE CRITERIA

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to solve problems in beverage dispensers

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve problems in beverage dispensers

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Problems are approached methodically drawing on operational knowledge of beverage dispensers systems using observation, measurement, calculations and comparison with normal operating values of system and components.
- 2.5 Information needed to solve problems is gathered and evaluated against normal operating parameters.  

Note:  
Examples of information needed to solve problems are system specifications, as-installed drawings, maintenance and service records and measured and calculated values of component operating parameters.
- 2.6 Problems are dealt with safely and with the approval of an authorised person.
- 2.7 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Complete work and document problem solving activities
  - 3.1 OHS risk control work completion measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Justification for solutions used to solve problems is documented
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in beverage dispensers. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.7 Beverage dispensers
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in solving at least three operational problem related to refrigerated beverage dispensers.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in beverage dispensers as described in 7) and including:
    - A Using methodical problem solving techniques
    - B Accessing relevant information
    - C Solving problems effectively
    - D Providing written justification for the solutions used
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in solving problems in beverage dispensers.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE009A      Carry out scheduled maintenance

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  4.3	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.6	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7

## **UEENEEJ016A      Solve problems in transport refrigeration systems**

### **Unit Descriptor**

**1)**

This unit covers solving problems in transport refrigeration systems. It encompasses working safely and to standards, applying knowledge of the components and operation of transport refrigeration systems, using effective problem solving techniques and documenting solutions.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ011A      Diagnose and rectify faults in refrigeration and air conditioning components and systems

UEENEEJ013A      Commission refrigeration and air conditioning systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      3      Writing      3      Numeracy      3

### **Application of the Unit**

**3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to solve problems in transport refrigeration systems

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve problems in transport refrigeration systems

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Problems are approached methodically drawing on operational knowledge of transport refrigeration systems using observation, measurement, calculations and comparison with normal operating values of system and components.
- 2.5 Information needed to solve problems is gathered and evaluated against normal operating parameters.
  - Note:  
Examples of information needed to solve problems are system specifications, as-installed drawings, maintenance and service records and measured and calculated values of component operating parameters.
- 2.6 Problems are dealt with safely and with the approval of an authorised person.
- 2.7 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Complete work and document problem solving activities.
  - 3.1 OHS risk control work completion measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Justification for solutions used to solve problems is documented
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in transport refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.8 Transport refrigeration systems
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in solving at least three operational problems related to transport refrigeration systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for

Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in transport refrigeration systems as described in 7) and including:
    - A Using methodical problem solving techniques
    - B Accessing relevant information
    - C Solving problems effectively
    - D Providing written justification for the solutions used
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in solving problems in transport refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE009A      Carry out scheduled maintenance

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:

		All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7

## **UEENEEJ017A      Solve problems in ultra-low temperature refrigeration systems**

### **Unit Descriptor**

**1)**

This unit covers solving problems in ultra-low temperature refrigeration systems, including compound and cascade systems. It encompasses working safely and to standards, applying knowledge of the components and operation of ultra-low temperature refrigeration systems, using effective problem solving techniques and documenting solutions.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ011A      Diagnose and rectify faults in refrigeration and air conditioning components and systems

UEENEEJ013A      Commission refrigeration and air conditioning systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      3      Writing      3      Numeracy      3

### **Application of the Unit**

**3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to

occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to Solve problems in ultra-low temperature refrigeration systems.

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

- |   |   |     |  |
|---|---|-----|--|
| 2 | Solve problems in ultra-low temperature refrigeration systems | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.   |
|   |   | 2.2 | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures  |
|   |   | 2.3 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures   |
|   |   | 2.4 | Problems are approached methodically drawing on operational knowledge of Ultra-low temperature refrigeration systems using observation, measurement, calculations and comparison with normal operating values of system and components.  |
|   |   | 2.5 | Information needed to solve problems is gathered and evaluated against normal operating parameters.<br><br>Note:<br>Examples of information needed to solve problems are system specifications, as-installed drawings, maintenance and service records and measured and calculated values of component operating parameters. |
|   |   | 2.6 | Problems are dealt with safely and with the approval of an authorised person.  |
|   |   | 2.7 | Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.   |
| 3 | Complete work and document problem solving activities.        | 3.1 | OHS risk control work completion measures and procedures are followed.   |
|   |   | 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
|   |   | 3.3 | Justification for solutions used to solve problems is documented   |
|   |   | 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in Ultra-low temperature refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.17.9	Ultra-low temperature refrigeration systems
2.18.1	Occupational Health and Safety principles
2.18.3.1	Refrigeration and air conditioning safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in solving at least three operational problems related to ultra-low temperature refrigeration systems. Ultra-low temperature refrigeration systems cover compound and cascade systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### **Overview of Assessment**

##### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in ultra-low temperature refrigeration systems as described in 7) and including:
    - A Using methodical problem solving techniques
    - B Accessing relevant information

- C Solving problems effectively
- D Providing written justification for the solutions used
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in solving problems in Ultra-low temperature refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE009A      Carry out scheduled maintenance

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

## Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7

## **UEENEEJ018A      Solve problems in post mix refrigeration systems**

### **Unit Descriptor**

**1)**

This unit covers solving problems in post mix refrigeration systems. It encompasses working safely and to standards, applying knowledge of the components and operation of post mix refrigeration systems, using effective problem solving techniques and documenting solutions.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ011A      Diagnose and rectify faults in refrigeration and air conditioning components and systems

UEENEEJ013A      Commission refrigeration and air conditioning systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading      3      Writing      3      Numeracy      3

### **Application of the Unit**

**3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to solve problems in post mix refrigeration systems.

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

- |   |  |     |  |
|---|--|-----|--|
| 2 | Solve problems in post mix refrigeration systems       | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.   |
|   |  | 2.2 | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures  |
|   |  | 2.3 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures   |
|   |  | 2.4 | Problems are approached methodically drawing on operational knowledge of post mix refrigeration systems using observation, measurement, calculations and comparison with normal operating values of system and components.   |
|   |  | 2.5 | Information needed to solve problems is gathered and evaluated against normal operating parameters.<br><br>Note:<br>Examples of information needed to solve problems are system specifications, as-installed drawings, maintenance and service records and measured and calculated values of component operating parameters. |
|   |  | 2.6 | Problems are dealt with safely and with the approval of an authorised person.  |
|   |  | 2.7 | Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.   |
| 3 | Complete work and document problem solving activities. | 3.1 | OHS risk control work completion measures and procedures are followed.   |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3 | Justification for solutions used to solve problems is documented   |
|   |  | 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in post mix refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.10.1 Post mix refrigeration systems
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in solving at least three operational problems related to post mix refrigeration systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### **Overview of Assessment**

##### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in post m ix refrigeration systems as described in 7) and including:
    - A Using methodical problem solving techniques
    - B Accessing relevant information

- C Solving problems effectively
- D Providing written justification for the solutions used
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in solving problems in post mix refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE009A      Carry out scheduled maintenance

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

## Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7

## UEENEEJ019A Solve problems in ice making systems

### Unit Descriptor

1)

This unit covers solving problems in ice making systems. It encompasses working safely and to standards, applying knowledge of the components and operation of ice making systems, using effective problem solving techniques and documenting solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ011A Diagnose and rectify faults in refrigeration and air conditioning components and systems

UEENEEJ013A Commission refrigeration and air conditioning systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to solve problems in ice making systems.

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve problems in ice making systems

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Problems are approached methodically drawing on operational knowledge of ice making systems using observation, measurement, calculations and comparison with normal operating values of system and components.
- 2.5 Information needed to solve problems is gathered and evaluated against normal operating parameters.
  - Note:  
Examples of information needed to solve problems are system specifications, as-installed drawings, maintenance and service records and measured and calculated values of component operating parameters.
- 2.6 Problems are dealt with safely and with the approval of an authorised person.
- 2.7 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Complete work and document problem solving activities.
  - 3.1 OHS risk control work completion measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with established procedures.
  - 3.3 Justification for solutions used to solve problems is documented
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in ice making systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.11 Ice making systems
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in solving at least three operational problems related to ice making systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in ice making systems as described in 7) and including:
    - A Using methodical problem solving techniques
    - B Accessing relevant information
    - C Solving problems effectively
    - D Providing written justification for the solutions used
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in solving problems in ice making systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE009A      Carry out scheduled maintenance

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7

## **UEENEEJ020A      Solve problems in industrial refrigeration systems**

### **Unit Descriptor**

**1)**

This unit covers solving problems in industrial refrigeration systems. It encompasses working safely and to standards, applying knowledge of the components and operation of industrial refrigeration systems, using effective problem solving techniques and documenting solutions.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ011A      Diagnose and rectify faults in refrigeration and air conditioning components and systems

UEENEEJ013A      Commission refrigeration and air conditioning systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      3      Writing      3      Numeracy      3

### **Application of the Unit**

**3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to solve problems in industrial refrigeration systems.

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

- |   |  |     |  |
|---|--|-----|--|
| 2 | Solve problems in industrial refrigeration systems     | 2.1 | OHS risk control measures and procedures for carrying out the work are followed.   |
|   |  | 2.2 | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures  |
|   |  | 2.3 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures   |
|   |  | 2.4 | Problems are approached methodically drawing on operational knowledge of industrial refrigeration systems using observation, measurement, calculations and comparison with normal operating values of system and components.   |
|   |  | 2.5 | Information needed to solve problems is gathered and evaluated against normal operating parameters.<br><br>Note:<br>Examples of information needed to solve problems are system specifications, as-installed drawings, maintenance and service records and measured and calculated values of component operating parameters. |
|   |  | 2.6 | Problems are dealt with safely and with the approval of an authorised person.  |
|   |  | 2.7 | Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.   |
| 3 | Complete work and document problem solving activities. | 3.1 | OHS risk control work completion measures and procedures are followed.   |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3 | Justification for solutions used to solve problems is documented   |
|   |  | 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in industrial refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.12 Industrial refrigeration systems
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in solving at least three operational problems related to industrial refrigeration systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### **Overview of Assessment**

##### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in industrial refrigeration systems as described in 7) and including:
    - A Using methodical problem solving techniques
    - B Accessing relevant information

- C Solving problems effectively
- D Providing written justification for the solutions used
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in solving problems in industrial refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE009A      Carry out scheduled maintenance

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

## Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7

## **UEENEEJ021A Monitor and adjust energy management systems on refrigeration systems**

### **Unit Descriptor**

**1)**

This unit covers the setting-up and adjusting energy management systems on refrigeration systems for effective energy use. It encompasses safe working practices, system parameter testing and analysis, adjusting equipment and controls, following procedures and documenting final operating parameters and settings.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ009A    Verify compliance and functionality of refrigeration and air conditioning installations

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 4 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to monitor and adjust energy management systems on refrigeration systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.5 System energy parameters are identified by reviewing system specifications and component technical data.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
- 1.7 Preparatory work is checked to ensure no damage has occurred and complies with requirements
- 1.8 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 1.9 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

2	Monitor and adjust energy management systems on refrigeration systems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Testing/measuring devices are connected and set up in accordance with requirements for a particular system.
		2.3	Monitoring and adjustments are made to equipment components and controls to provide effective energy use in accordance with system specifications and regulatory requirements.
		2.4	Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
		2.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
		2.6	Monitoring and adjusting is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles.
3	Completion and report monitoring adjusting activities.	3.1	OHS risk control work completion measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Monitoring and adjustment settings are documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and monitoring and adjusting energy management systems on refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.15.16	Energy management systems for commercial refrigeration
2.18.1	Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to monitoring and adjusting two different types of energy management systems for refrigeration systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Monitor and adjust energy management systems on refrigeration systems as described in 7) and including:
    - A Identifying system energy parameters
    - B Monitoring and adjusting system components and controls to provide effective energy use
    - C Ensuring system energy use is accordance with requirements
    - D Documenting adjustment settings with established procedures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in monitoring and adjusting energy management systems on refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	3

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.3; 2.4; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.5; 2.6

## UEENEEJ022A **Diagnose faults in complex refrigeration or HVAC control systems**

### Unit Descriptor

1)

This unit covers diagnosing and rectifying faults in complex refrigeration or heating, ventilation and air conditioning (HVAC) control systems. It encompasses safe working practices, interpreting technical data, applying knowledge of complex refrigeration or heating, ventilation and air conditioning (HVAC) control systems operating parameters to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ012A     Diagnose and rectify faults in complex refrigeration/air conditioning systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 4 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during

training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
- 1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- |   |   |  |
|---|---|--|
|   | 2.3   | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |
|   | 2.4   | Logical diagnostic methods are applied to diagnose control system faults employing measurements and estimations of system operating parameters referenced to system operational requirements.            |
|   | 2.5   | Suspected fault scenarios are tested as being the source of system problems.   |
|   | 2.6   | Causes of the faults are identified and appropriately competent persons are engaged to rectify the fault where it is out side the scope of the control system.   |
|   | 2.7   | Faults in system components of the system are rectified to raise the refrigeration or heating, ventilation air conditioning systems to its operation standard.   |
|   | 2.8   | System is tested to verify that the system operates as intended and to specified requirements.   |
|   | 2.9   | Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.   |
|   | 2.10  | Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.  |
|   | 2.11  | Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Complete and report fault diagnosis and rectification activities. | 3.1 OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2 Work site is made safe in accordance with established safety procedures.   |
|   |   | 3.3 Rectification of faults is documented in accordance with established procedures.   |
|   |   | 3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.   |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing faults in complex refrigeration or HVAC control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.15.17 Refrigeration/HVAC direct digital controls

2.15.18 Refrigeration/HVAC pneumatic controls

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to diagnosing and rectifying at least four faults in complex refrigeration or HVAC control systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical

equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose faults in complex refrigeration or HVAC control systems as described in 7) and including:
    - A Applying logical diagnostic methods
    - B Using fault scenarios to test the cause of system faults

- C Identifying faults and competency needed to rectify them
- D Rectifying faults in system controls
- E Verifying that the system operates correctly
- F Documenting fault rectification
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in diagnosing faults in complex refrigeration or HVAC control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3; 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4	2

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.10	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.8	32

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  2.9
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.8; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.9; 2.10

## **UEENEEJ023A Commission complex heating, ventilation and air conditioning (HVAC) systems**

### **Unit Descriptor**

**1)**

This unit covers the setting-up and adjusting complex heating, ventilation and air conditioning (HVAC) systems for optimum performance. It encompasses safe working practices, system parameter testing and analysis, adjusting equipment and controls, following procedures and documenting final operating parameters and settings.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ012A Diagnose and rectify faults in complex refrigeration/air conditioning systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 4 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to commission complex heating, ventilation and air conditioning systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.5 System operating parameters are identified by reviewing system specifications and component technical data.
- 1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.7 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
- 1.8 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

	1.9	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
2 Commission complex heating, ventilation and air conditioning systems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Testing/measuring devices are connected and set up in accordance with requirements for a particular system.
	2.3	Measurements and adjustments are made to equipment components and controls to provide optimum system performance in accordance with system specifications and regulatory requirements.
	2.4	Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
	2.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.6	Commissioning is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles.
3 Completion and report commissioning activities.	3.1	OHS risk control work completion measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Adjustment settings are documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and commissioning complex heating, ventilation and air conditioning (HVAC) systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.19 HVAC air systems
- 2.16.9 Commissioning HVAC system
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to commissioning two different types of complex heating, ventilation and air conditioning systems, incorporating multiple major components (i.e. compressors, condenser or evaporators) circuits or systems and associated components and controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when

choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Commissioning complex heating, ventilation and air conditioning (HVAC) systems as described in 7) and including:
    - A Identifying system design operating parameters
    - B Measuring and adjusting system components and controls to provide optimum system performance
    - C Ensuring system operates within regulatory requirements
    - D Documenting adjustment settings with established procedures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in commissioning complex heating, ventilation and air conditioning (HVAC) systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	3

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.3; 2.4; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## **UEENEEJ024A Commission hydronic systems for refrigeration and/or air conditioning**

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the setting-up and adjusting hydronic systems for refrigeration and/or air conditioning for optimum performance. It encompasses safe working practices, system parameter testing and analysis, adjusting equipment and controls, following procedures and documenting final operating parameters and settings.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed</p> <p>UEENEEJ012A     Diagnose and rectify faults in complex refrigeration/air conditioning systems</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">4</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">4</td> </tr> </table>	Reading	4	Writing	4	Numeracy	4
Reading	4	Writing	4	Numeracy	4		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 4 level.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts</p>						

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to commission hydronic systems for refrigeration and air conditioning

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.5 System operating parameters are identified by reviewing system specifications and component technical data.
- 1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.7 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
- 1.8 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

	1.9	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
2 Commission hydronic systems for refrigeration and air conditioning.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Testing/measuring devices are connected and set up in accordance with requirements for a particular system.
	2.3	Measurements and adjustments are made to equipment components and controls to provide optimum system performance in accordance with system specifications and regulatory requirements.
	2.4	Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
	2.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.6	Commissioning is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles.
3 Completion and report commissioning activities.	3.1	OHS risk control work completion measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Adjustment settings are documented and an appropriate person or persons notified in accordance with established procedures.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and commissioning hydronic systems for refrigeration and/or air conditioning. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.20 HVAC hydronic systems
- 2.16.9 Commissioning HVAC system
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to commissioning two different hydronic systems for refrigeration and/or air conditioning systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for

Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Commission hydronic systems for refrigeration and/or air conditioning systems as described in 7) and including:
    - A Identifying system operating parameters
    - B Measuring and adjusting system components and controls to provide optimum system performance
    - C Ensuring system operates within regulatory requirements
    - D Documenting adjustment settings with established procedures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in commissioning hydronic systems for refrigeration and/or air conditioning.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3	2

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	3

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.3	3

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.3; 2.4; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## **UEENEEJ025A Commission complex refrigeration systems**

### **Unit Descriptor**

**1)**

This unit covers the setting-up and adjusting complex refrigeration systems for optimum performance. It encompasses safe working practices, system parameter testing and analysis, adjusting equipment and controls, following procedures and documenting final operating parameters and settings.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ012A Diagnose and rectify faults in complex refrigeration/air conditioning systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 4 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to commission complex refrigeration systems.

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.5 System operating parameters are identified by reviewing system specifications and component technical data.
- 1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.7 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
- 1.8 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

	1.9	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
2	Commission complex refrigeration systems.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Testing/measuring devices are connected and set up in accordance with requirements for a particular system.
	2.3	Measurements and adjustments are made to equipment components and controls to provide optimum system performance in accordance with system specifications and regulatory requirements.
	2.4	Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
	2.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.6	Commissioning is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles.
3	Completion and report commissioning activities.	3.1 OHS risk control work completion measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Adjustment settings are documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and commissioning complex refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.16.9 Commissioning HVAC system

2.16.10 Commissioning commercial/industrial refrigeration systems

## 2.18.1 Occupational Health and Safety principles

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to commissioning two different types of complex refrigeration systems, incorporating multiple major components (i.e. compressors, condenser or evaporators) circuits or systems and associated components and controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment****8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently

practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Commission complex refrigeration systems as described in 7) and including:
    - A Identifying system operating parameters
    - B Measuring and adjusting system components and controls to provide optimum system performance
    - C Ensuring system operates within regulatory requirements
    - D Documenting adjustment settings with established procedures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in commissioning complex refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3	3

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:

		1.3; 2.4; 2.5
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## **UEENEEJ026A Commission complex control systems for refrigeration/air conditioning**

### **Unit Descriptor**

**1)**

This unit covers the setting-up and adjusting complex control systems for refrigeration and air conditioning for optimum performance. It encompasses safe working practices, system parameter testing and analysis, adjusting equipment and controls, following procedures and documenting final operating parameters and settings.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ012A Diagnose and rectify faults in complex refrigeration/air conditioning systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 4 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to commission complex control systems for refrigeration and air conditioning.

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.5 System operating parameters are identified by reviewing system specifications and component technical data.
- 1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.7 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
- 1.8 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

	1.9	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
2 Commission complex control systems for refrigeration and air conditioning.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Testing/measuring devices are connected and set up in accordance with requirements for a particular system.
	2.3	Measurements and adjustments are made to equipment components and controls to provide optimum system performance in accordance with system specifications and regulatory requirements.
	2.4	Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
	2.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.6	Commissioning is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles.
3 Completion and report commissioning activities.	3.1	OHS risk control work completion measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Adjustment settings are documented and an appropriate person or persons notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and commissioning complex control systems for refrigeration/air conditioning. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.21 Refrigeration/HVAC electronic controls
- 2.16.9 Commissioning HVAC system
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to commissioning two different complex control systems for refrigeration and air conditioning.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for

Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Commission complex control systems for refrigeration/air conditioning as described in 7) and including:
    - A Identifying system operating parameters
    - B Measuring and adjusting system components and controls to provide optimum system performance
    - C Ensuring system operates within regulatory requirements
    - D Documenting adjustment settings with established procedures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in commissioning complex control systems for refrigeration/air conditioning.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3	2

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.5; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3	3

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: 1.3; 2.4; 2.5

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 2.5; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## **UEENEEJ027A Determine thermodynamic parameters of refrigeration and air conditioning systems**

### **Unit Descriptor**

1)

This unit covers the determination of the thermodynamic parameters of refrigeration and air conditioning systems. It encompasses working safely, determining thermodynamic parameters of using measurement and basic calculation methods and documenting results.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ064A Analyse the operation of HVAC/R systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training or institutional based delivery at the aligned AQF 4 level.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to determine thermodynamic parameters of refrigeration and air conditioning systems

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The expected operating conditions are obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Tools, equipment and testing devices needed to determine the basic operating conditions are obtained and checked for correct operation and safety
- 1.6 The expected operating conditions are obtained from documentation or from work supervisor to establish the scope of work to be undertaken.

2	Determine thermodynamic parameters of refrigeration and air conditioning systems	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Measurement of thermodynamic system operating parameters is conducted in strict accordance with OHS requirements and established safety procedures
		2.3	System is checked and isolated where necessary, in strict accordance OHS requirements and procedures
		2.4	Established procedures are used to determine actual and specified range of thermodynamic parameters from measured and calculated values as they apply to particular refrigeration or air conditioning systems.
		2.5	Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
		2.6	Unexpected situations are dealt with safely and with the approval of an authorised person.
		2.7	Thermodynamic parameters are determined without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3	Document determined thermodynamic parameters	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work site and equipment is cleaned and made safe in accordance with established procedures.
		3.3	Thermodynamic parameters are documented including identification of any parameter that is not within the specified range for the system.
		3.4	Work supervisor is notified of the completion of the work in accordance with established procedures.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and determining thermodynamic parameters of refrigeration and air conditioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.14.1 Refrigeration engineering mathematics fundamentals
- 2.17.15 Refrigeration science
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to determining thermodynamic parameters using measurement and calculation methods of a refrigeration or air conditioning system, including temperature, pressure, relative humidity and enthalpy.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Determine thermodynamic parameters of refrigeration and air conditioning systems as described in 7) and including:
    - A Selecting and using appropriate measuring devices correctly
    - B Interpreting measurements
    - C Using calculation methods accurately
    - D Identifying parameters not within the specified range

- E Documenting thermodynamic parameters correctly
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in determining thermodynamic parameters of refrigeration and air conditioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.4; 2.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.5; 1.6; 2.2 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## UEENEEJ028A Produce HVAC/R design drawings

### Unit Descriptor

1)

This unit covers interpreting technical data and project specifications and produce HVAC/R design drawing. It encompasses safe working practices, interpreting technical data and specifications, applying knowledge heating, ventilation, air conditioning and/or refrigeration systems design drawing protocols, using appropriate drawing tools and documenting design. .

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ064A Analyse the operation of HVAC/R systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 4 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

## Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

## Refrigeration and Air Conditioning

**ELEMENT****PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to produce HVAC/R design drawings.

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 The extent of the work is determined from project specifications and discussion with appropriate personnel
- 1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.5 Software tools and equipment a needed for the work are obtained in accordance with established procedures

2 Produce HVAC/R design drawings

- 2.1 OHS risk control measures and procedures for carrying out the work are followed
- 2.2 The types of design drawings and layouts required are determined from project specifications
- 2.3 Technical data of system components is interpreted to determine parameters that are to be included in the drawings
- 2.4 Appropriate software tools are used to produce drawing based on standard protocols
- 2.5 Drawings are checked for accuracy are compliance with project specifications

		2.6	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
3	Complete and report HVAC/R design drawings	3.1	Completed drawings are submitted to an appropriate person to be checking for accuracy and compliance with project specifications.
		3.2	Any alterations, additions or correction instructions are followed and drawings are re-submitted for final approval
		3.3	Copies of completed drawings are filed securely in accordance with established procedures

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and producing HVAC/R design drawings. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.16.11 Air conditioning drawing

2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to producing design drawings for at least two different HVAC/R projects.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Produce HVAC/R design drawings as described in 7) and including:
    - A Understanding the extent of the drawing work accurately
    - B Determining appropriate types of drawings and their layouts correctly
    - C Including appropriate technical data parameters in the drawings
    - D Checking and correcting drawings accurately
    - E Filing copies of completed drawings securely
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in producing HVAC/R design drawings.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	3.2; 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 2.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEJ029A Determine the heat loads for commercial refrigeration and air conditioning applications**

### **Unit Descriptor**

1)

This unit covers the determination of the heat loads for commercial refrigeration and air conditioning applications. It encompasses working safely; determining heat loads using quick selection, short form paper and computer based methods and documenting results.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ064A Analyse the operation of HVAC/R systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training or institutional based delivery at the aligned AQF 4 level.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1	Prepare to design commercial refrigeration systems.	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	The extent and nature of the refrigeration system is determined from design specifications
		1.3	Safety and other regulatory requirements to which the system shall comply are identified, obtained and understood
		1.4	Work supervisor or customers are consulted to determine which functions of the system are to be use and the parameter of each and written confirmation sought.
		1.5	Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.
2	Design commercial refrigeration systems	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Knowledge of refrigeration and food storage technology, refrigeration system components and piping, performance standards and compliance methods are applied to developing the system design
		2.3	Safety, functional and budgetary considerations are incorporated in the installation design.

- 2.4 Equipment required for the system is selected in accordance with the design specifications and established requirements.
  - 2.5 Location of components of the system is documented to ensure correct operation of system functions.
  - 2.6 System design draft is checked for compliance with the design brief and regulatory requirements.
  - 2.7 System design is documented for submission to appropriate person(s) for approval.
  - 2.8 Solutions to unplanned situation are provided consistent with organisation's policy.
- 3 Obtain approval for engineering computer applications design
- 3.1 System design is presented and explained to client representative and/or other relevant person(s).
  - 3.2 Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation's policy.
  - 3.3 Final design is documented and approval obtained from appropriate person(s).
  - 3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and determining the heat loads for commercial refrigeration and air conditioning applications. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.16 Heat load estimating for commercial refrigeration
- 2.17.17.1 HVAC load estimating fundamentals
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to determining heat loads using quick selection

short form paper and computer based methods for a refrigeration or air conditioning system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Determine the heat loads for commercial refrigeration and air conditioning applications as described in 7) and including:
    - A Establishing system parameters for heat load
    - B Select appropriate head load calculation tools
    - C Identifying heat loads accurately
    - D Using calculation methods accurately
    - E Documenting heat loads correctly
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

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**Context of and  
specific  
resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice

**assessment** using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in determining the heat loads for commercial refrigeration and air conditioning applications.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4	1

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 2.2 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## **UEENEEJ030A Produce HVAC/R control system design diagrams**

### **Unit Descriptor**

**1)**

This unit covers interpreting technical data and project specifications and produce HVAC/R control system diagrams. It encompasses safe working practices, interpreting technical data and specifications, applying knowledge heating, ventilation, air conditioning and/or refrigeration control systems drawing protocols, using appropriate drawing tools and documenting design.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ064A Analyse the operation of HVAC/R systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 4 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

### **Competency Field**

**4)**

## Refrigeration and Air Conditioning

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to produce HVAC/R control system design diagrams	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the work is determined from project specifications and discussion with appropriate personnel.</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.</p> <p>1.5 Software tools and equipment a needed for the work are obtained in accordance with established procedures</p>
2 Produce HVAC/R control system design diagrams	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The types of control diagrams and layouts required are determined from project specifications.</p> <p>2.3 Technical data of control system components is interpreted to determine parameters that are to be included in the diagrams</p> <p>2.4 Appropriate software tools are used to produce diagrams based on standard protocols.</p> <p>2.5 Diagrams are checked for accuracy are compliance with project specifications.</p> <p>2.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.</p>
3 Complete and report HVAC/R control system design diagrams	3.1 Completed control diagrams are submitted to an appropriate person to be checked for accuracy and compliance with project specifications.

- 3.2 Any alterations, additions or correction instructions are followed and diagrams are re-submitted for final approval
- 3.3 Copies of completed diagrams are filed securely in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and producing HVAC/R control system design diagrams. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.15.15 HVAC control system fundamentals

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to producing control system design diagrams for at least two different HVAC/R projects.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However,

it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Produce HVAC/R control system design diagrams as described in 7) and including:
    - A Understanding the extent of the drawing work accurately
    - B Determining appropriate types of diagrams and their layouts correctly
    - C Including appropriate technical data parameters in the diagrams
    - D Checking and correcting diagrams accurately
    - E Filing copies of completed drawing securely
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in producing HVAC/R control system design diagrams.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and

incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3 to 3.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2; 2.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2; 2.3; 2.6	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEJ031A Provide solutions to vibration problems in HVAC/R system design**

### **Unit Descriptor**

**1)**

This unit covers the solution for the appropriate selection and use of materials relative to vibration problems in HVAC/R system. It encompasses working safely, problem solving procedures, including using measuring instruments, applying appropriate theorems and providing solutions derived from measurements and calculations and justification for such solutions.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ065A Evaluate fluid and thermodynamic parameters of refrigeration systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

### **Application of the Unit**

**3)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training or institutional based delivery at the aligned AQF 5 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the characteristics and behaviour of material in an engineering environment.

### **Competency Field**

**4)**

Refrigeration and Air Conditioning

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to Provide solutions to vibration problems in HVAC/R system design	<p>1.1 OH&amp;S procedures for a given work area are obtained and understood</p> <p>1.2 OH&amp;S risk control work preparation measures and procedures are followed.</p> <p>1.3 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Sources of equipment and products that may be required for the work are established in accordance with established procedures.</p> <p>1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety</p>
2 Provide solutions to vibration problems in HVAC/R system design	<p>2.1 OHS risk control work measures and procedures are followed.</p> <p>2.2 The need to test or measure active systems is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures</p> <p>2.3 Systems are checked as being isolated where necessary in strict accordance OHS requirements and procedures</p> <p>2.4 Established methods are used to solving vibration problems from measure and calculated values, as they apply to HVAC/R system design.</p> <p>2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.</p> <p>2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices with the minimum waste and rework.</p>

- |   |  |     |  |
|---|--|-----|--|
| 3 | Document solutions to vibration problems in HVAC/R system design | 3.1 | OH&S work completion risk control measures and procedures are followed.  |
|   |  | 3.2 | Work site is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3 | Justification for solutions used to solve system problems is documented.   |
|   |  | 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions to vibration problems in HVAC/R system design. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.17.20 Materials strength fundamentals

2.17.21.1 Noise and vibration control fundamentals

2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to providing solutions to vibration problems in at least two HVAC/R system designs.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide solutions to vibration problems in HVAC/R system design as described in 7) and including:
    - A Determining the characteristics and application of materials and the effects of thermodynamics
    - B Using established problem solving methods
    - C Taking relevant measurements accurately
    - D Interpreting measured values appropriately
    - E Providing effective solutions to system problems from measurements and calculations
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in providing solutions to vibration problems in HVAC/R system design.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4; 2.4	3

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	3

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## **UEENEEJ032A      Design commercial refrigeration systems**

### **Unit Descriptor**

**1)**

This unit covers the design of commercial refrigeration systems. It encompasses applying knowledge of refrigeration and food storage technology, refrigeration system components and piping, safety and regulatory requirements, following design specifications and customer requirements and documenting system designs.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ031A      Provide solutions to vibration problems in HVAC and Refrigeration system design

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

**3)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training or institutional based delivery at the aligned AQF 5 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to design commercial refrigeration systems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 The extent and nature of the refrigeration system is determined from design specifications.
- 1.3 Safety and other regulatory requirements to which the system shall comply are identified, obtained and understood
- 1.4 Work supervisor or customers are consulted to determine which functions of the system are to be use and the parameter of each and written confirmation sought.
- 1.5 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.

2 Design commercial refrigeration systems.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of refrigeration and food storage technology, refrigeration system components and piping, performance standards and compliance methods are applied to developing the system design
- 2.3 Safety, functional and budgetary considerations are incorporated in the installation design.
- 2.4 Equipment required for the system is selected in accordance with the design specifications and established requirements.
- 2.5 Location of components of the system is documented to ensure correct operation of system functions.
- 2.6 System design draft is checked for compliance with the design brief and regulatory requirements.

	2.7	System design is documented for submission to appropriate person(s) for approval.
	2.8	Solutions to unplanned situation are provided consistent with organisation's policy.
3	Obtain approval for engineering computer applications design	
	3.1	System design is presented and explained to client representative and/or other relevant person(s).
	3.2	Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation's policy.
	3.3	Final design is documented and approval obtained from appropriate person(s).
	3.4	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing commercial refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.6	Technical standards, regulations and codes for refrigeration and air conditioning
2.16.16	Refrigeration System Components and Piping
2.17.22	Refrigeration and food storage technology
2.18.1	Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different commercial refrigeration systems encompassing only one of each major component (i.e. condenser, compressor and evaporator) and associated components and controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects  
of evidence  
required to  
demonstrate  
competency in  
this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design commercial refrigeration systems as described in 7) and including:
    - A Understanding required operating functions and parameters from the design specification
    - B Developing the design within the safety, regulatory and functional requirements and budget limitations
    - C Documenting and presenting design effectively,
    - D Successfully negotiating design alteration requests
    - E Obtaining approval for final design
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in designing commercial refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 3.1 to 3.3	2

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4; 3.1 to 3.3	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.7	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.8; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## UEENEEJ033A Design industrial refrigeration systems

### Unit Descriptor

1)

This unit covers the design of industrial refrigeration systems. It encompasses applying knowledge of refrigeration and food storage technology, industrial refrigeration system components and piping, safety and regulatory requirements, following design specifications and customer requirements and documenting system designs.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ031A Provide solutions to vibration problems in HVAC and Refrigeration system design

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training or institutional based delivery at the aligned AQF 5 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

### Competency Field

4)

Refrigeration and Air Conditioning

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Prepare to design industrial refrigeration systems.	1.1	OHS processes and procedures for a given work area are identified, obtained and understood
		1.2	The extent and nature of the refrigeration system is determined from design specifications.
		1.3	Safety and other regulatory requirements to which the system shall comply are identified, obtained and understood
		1.4	Work supervisor or customers are consulted to determine which functions of the system are to be use and the parameter of each and written confirmation sought.
		1.5	Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.
2	Design industrial refrigeration systems.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Knowledge of refrigeration and food storage technology, refrigeration system components and piping, performance standards and compliance methods are applied to developing the system design
		2.3	Safety, functional and budgetary considerations are incorporated in the installation design.
		2.4	Equipment required for the system is selected in accordance with the design specifications and established requirements.
		2.5	Location of components of the system is documented to ensure correct operation of system functions.
		2.6	System design draft is checked for compliance with the design brief and regulatory requirements.
		2.7	System design is documented for submission to appropriate person(s) for approval.
		2.8	Solutions to unplanned situation are provided consistent with organisation's policy.

- |   |  |     |  |
|---|--|-----|--|
| 3 | Obtain approval for engineering computer applications design | 3.1 | System design is presented and explained to client representative and/or other relevant person(s).                               |
|   |  | 3.2 | Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation's policy.   |
|   |  | 3.3 | Final design is documented and approval obtained from appropriate person(s).   |
|   |  | 3.4 | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing industrial refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |           |   |
|-----------|---|
| 2.5.6     | Technical standards, regulations and codes for refrigeration and air conditioning |
| 2.16.16   | Refrigeration System Components and Piping  |
| 2.17.22   | Refrigeration and food storage technology   |
| 2.17.23.1 | Industrial refrigeration systems design fundamentals                              |
| 2.18.1    | Occupational Health and Safety principles   |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different commercial refrigeration systems encompassing only one of each major component (i.e. condenser, compressor and evaporator) and associated components and controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design industrial refrigeration systems as described in 7) and including:
    - A Understanding required operating functions and parameters from the design specification
    - B Developing the design within the safety, regulatory and functional requirements and budget limitations
    - C Documenting and presenting design effectively,
    - D Successfully negotiating design alteration requests
    - E Obtaining approval for final design
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in designing industrial refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 3.1 to 3.3	2

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.7	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.8; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  All	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## **UEENEEJ034A      Design heating, ventilation and air conditioning (HVAC) systems**

### **Unit Descriptor**

**1)**

This unit covers the design of heating, ventilation and air conditioning systems. It encompasses applying knowledge of commercial air conditioning systems, components and piping, safety and regulatory requirements, following design specifications and customer requirements and documenting system designs.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ031A      Provide solutions to vibration problems in HVAC and Refrigeration system design

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      4      Writing      4      Numeracy      4

### **Application of the Unit**

**3)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training or institutional based delivery at the aligned AQF 5 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to design commercial refrigeration systems.

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 The extent and nature of the refrigeration system is determined from design specifications.
- 1.3 Safety and other regulatory requirements to which the system shall comply are identified, obtained and understood
- 1.4 Work supervisor or customers are consulted to determine which functions of the system are to be use and the parameter of each and written confirmation sought.
- 1.5 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.

2 Design commercial refrigeration systems.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of refrigeration and food storage technology, refrigeration system components and piping, performance standards and compliance methods are applied to developing the system design
- 2.3 Safety, functional and budgetary considerations are incorporated in the installation design.
- 2.4 Equipment required for the system is selected in accordance with the design specifications and established requirements.
- 2.5 Location of components of the system is documented to ensure correct operation of system functions.
- 2.6 System design draft is checked for compliance with the design brief and regulatory requirements.

	2.7	System design is documented for submission to appropriate person(s) for approval.
	2.8	Solutions to unplanned situation are provided consistent with organisation’s policy.
3	Obtain approval for engineering computer applications design	3.1 System design is presented and explained to client representative and/or other relevant person(s).
	3.2	Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation’s policy.
	3.3	Final design is documented and approval obtained from appropriate person(s).
	3.4	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing heating, ventilation and air conditioning (HVAC) systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.5.6	Technical standards, regulations and codes for refrigeration and air conditioning
2.16.16	Refrigeration System Components and Piping
2.17.24	Commercial air conditioning systems design
2.18.1	Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different heating, ventilation and air conditioning encompassing only one of each major component (i.e. air handling plant, condenser, compressor and evaporator) and associated components and controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design heating, ventilation and air conditioning (HVAC) systems as described in 7) and including:
    - A Understanding required operating functions and parameters from the design specification
    - B Developing the design within the safety, regulatory and functional requirements and budget limitations
    - C Documenting and presenting design effectively
    - D Successfully negotiating design alteration requests
    - E Obtaining approval for final design
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in designing heating, ventilation and air conditioning (HVAC) systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 3.1 to 3.3	2

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.7	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.8; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## **UEENEEJ035A Design control systems for a heating, ventilation, air conditioning or refrigeration system**

### **Unit Descriptor**

1)

This unit covers the design control systems for a heating, ventilation, air conditioning or refrigeration system. It encompasses applying knowledge of refrigeration and air conditioning, control systems components, safety and regulatory requirements, following design specifications and customer requirements and documenting system designs..

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ030A Produce R/HVAC control system design diagrams

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### **Application of the Unit**

3)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training or institutional based delivery at the aligned AQF 4 level.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

### **Competency Field**

4)

Refrigeration and Air Conditioning

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to design commercial refrigeration systems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 The extent and nature of the refrigeration system is determined from design specifications.</p> <p>1.3 Safety and other regulatory requirements to which the system shall comply are identified, obtained and understood</p> <p>1.4 Work supervisor or customers are consulted to determine which functions of the system are to be use and the parameter of each and written confirmation sought.</p> <p>1.5 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.</p>
2 Design commercial refrigeration systems.	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Knowledge of control systems components, performance standards and compliance methods are applied to developing the system design</p> <p>2.3 Safety, functional and budgetary considerations are incorporated in the installation design.</p> <p>2.4 Equipment required for the system is selected in accordance with the design specifications and established requirements.</p> <p>2.5 Location of components of the system is documented to ensure correct operation of system functions.</p> <p>2.6 System design draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.7 System design is documented for submission to appropriate person(s) for approval.</p> <p>2.8 Solutions to unplanned situation are provided consistent with organisation’s policy.</p>

- |   |  |     |  |
|---|--|-----|--|
| 3 | Obtain approval for engineering computer applications design | 3.1 | System design is presented and explained to client representative and/or other relevant person(s).                               |
|   |  | 3.2 | Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation's policy.   |
|   |  | 3.3 | Final design is documented and approval obtained from appropriate person(s).   |
|   |  | 3.4 | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing control systems for a heating, ventilation, air conditioning or refrigeration system. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.5.6   | Technical standards, regulations and codes for refrigeration and air conditioning |
| 2.15.17 | Refrigeration/HVAC direct digital controls  |
| 2.15.18 | Refrigeration/HVAC pneumatic controls   |
| 2.18.1  | Occupational Health and Safety principles   |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing a control system for at least two different heating, ventilation, air conditioning or refrigeration systems encompassing only one of each major component (i.e. condenser, compressor and evaporator) and associated components and controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design control systems for a heating, ventilation, air conditioning or refrigeration system as described in 7) and including:
    - A Understanding required operating functions and parameters from the design specification
    - B Developing the design within the safety, regulatory and functional requirements and budget limitations
    - C Documenting and presenting design effectively
    - D Successfully negotiating design alteration requests
    - E Obtaining approval for final design
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in designing control systems for a heating, ventilation, air conditioning or refrigeration system.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	1.4; 3.1 to 3.3	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.7	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.8; 3.2	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## **UEENEEJ036A Evaluate and report on energy management**

### **Unit Descriptor**

**1)**

This unit covers evaluation of energy management building services plant and machinery. It encompasses working safely, setting up and conducting evaluation measurements, evaluating energy use from measured parameters and reporting results including recommending any resulting corrective actions.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ009A    Verify compliance and functionality of refrigeration and air conditioning installations

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of refrigeration or air conditioning work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting

equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.  
 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to evaluate and report on energy management.

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of evaluation is determined from specifications of building services plant and machinery and discussion with appropriate personnel.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety.

2 Evaluate energy management.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 In-depth knowledge of the energy management of building services plant and machinery is applied to the evaluation process
- 2.4 Energy evaluation tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny.
- 2.5 Energy evaluation tests are carried out methodically and results and comments systematically noted.
- 2.6 Unexpected situations are dealt with safely and with the approval of an authorised person.

	2.7	Evaluation is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practices.
3	Report on energy management	3.1 OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Results of energy management evaluation are documented including recommendations and justification for improvements.
	3.4	Energy evaluation report is forwarded to appropriate person(s).

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and evaluating and reporting on energy management. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.16.12 Energy management fundamentals
- 2.16.13 Building management systems
- 2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to at least two different types of building services plant and machinery.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Evaluate and report on energy management as described in 7) and including:
    - A Determining the extent of the evaluation.
    - B Setting up and conducting appropriate examinations and tests.
    - C Reporting evaluation including recommendation for improving energy efficiency
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in evaluating and reporting on energy management.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4; 2.6	3
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	3.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEEJ037A Evaluate and report on air quality in buildings**

### **Unit Descriptor**

1)

This unit covers evaluation of air quality in building. It encompasses working safely, setting up and conducting evaluation measurements, evaluating air quality from measured parameters and reporting results including recommending any resulting corrective actions.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ009A    Verify compliance and functionality of refrigeration and air conditioning installations

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of refrigeration or air conditioning work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to evaluate and report on air quality in buildings..

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of evaluation is determined from specifications of building ventilation/air conditioning and internal and external environmental factors and discussion with appropriate personnel.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety.

2 Evaluate air quality in buildings.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 In-depth knowledge of the air quality requirements and regulations in buildings is applied to the evaluation process.
- 2.4 Air quality evaluation tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny.
- 2.5 Air quality evaluation tests are carried out methodically and results and comments systematically noted.

	2.6	Unexpected situations are dealt with safely and with the approval of an authorised person.	
	2.7	Evaluation is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practices.	
3	Report on air quality buildings.	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Results of air quality evaluation are documented including unacceptable conditions and recommendation for improvement.
		3.4	Energy evaluation report is forwarded to appropriate person(s).

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and evaluating and reporting on air quality in buildings. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.16.14 Management of indoor air quality

2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to at least two different types of buildings with or without air conditioning.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Evaluate and report on air quality in buildings as described in 7) and including:
    - A Determining the extent of the evaluation.
    - B Setting up and conducting appropriate examinations and tests.
    - C Reporting evaluation including recommendation for improving energy efficiency
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in evaluating and reporting on air quality in buildings.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.1; 1.3; 1.4; 2.6	3
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	3.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEEJ038A Analyse noise and vibration in refrigeration and air conditioning systems**

### **Unit Descriptor**

1)

This unit covers the analysis of refrigeration and air conditioning systems to provide solution to noise and vibration issues. It encompasses working safely, apply extensive knowledge of noise, vibration and thermodynamic parameters, gathering and analysing data, applying problem solving techniques, developing and documenting results and solutions for use in design work.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ065A Evaluate fluid and thermodynamic parameters of refrigeration systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1	Prepare to analyse noise and vibration in refrigeration and air conditioning systems	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	The extent of the noise and vibration issue is determined from performance specifications and situation reports and in consultations with relevant persons.
		1.4	Activities are planned to meet scheduled timelines in consultation with others involved in the work.
		1.5	Effective strategies are formed to ensure solution development and implementation is carried out efficiently.
2	Analyse noise and vibration in refrigeration and air conditioning systems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Knowledge of noise, vibration and thermodynamics are applied to analytical solutions to refrigeration and air conditioning systems.
		2.3	Parameters, specifications and performance requirements in relation to refrigeration and air conditioning systems are obtained in accordance with established procedures.
		2.4	Approaches to analysing noise, vibration and thermodynamic parameters are carried out to provide the most effective solution.

- |   |   |  |
|---|---|--|
|   | 2.5   | Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.  |
|   | 2.6   | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards  |
| 3 | Document and report on the results of the noise and vibration and analysis and actions taken. | 3.1 Solutions to noise and vibration issues are evaluated to determine their effectiveness and modified where necessary.   |
|   | 3.2   | Analysis is documented including details of all findings, calculations and assumptions.  |
|   | 3.3   | Analysis is reported to appropriately personnel to establish appropriate action to be taken based on findings.   |
|   | 3.4   | Justification for findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with professional standards. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and analysing noise and vibration in refrigeration and air conditioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |           |   |
|-----------|---|
| 2.5.6     | Technical standards, regulations and codes for refrigeration and air conditioning |
| 2.17.18.2 | Thermodynamics  |
| 2.17.21.1 | Noise and vibration parameters and requirements                                   |
| 2.17.21.2 | Advanced noise and vibration control  |
| 2.17.25   | Static  |
| 2.18.1    | Occupational Health and Safety principles   |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to analysing noise and vibration in at least two different refrigeration and air conditioning systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment

instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Analyse noise and vibration in refrigeration and air conditioning systems as described in 7) and including:

- A Understanding the noise and vibration issues
- B Forming effective strategies for analysing refrigeration and air conditioning systems performance
- C Obtaining noise, vibration and thermodynamic parameters, specifications and performance requirements appropriate to each situation.
- D Evaluating the results of the analysis
- E Documenting analysis details of all findings, calculations and assumptions.

- F Documenting justification of actions to be implemented in accordance with professional standards
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in analysing noise and vibration in refrigeration and air conditioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
1 Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## **UEENEEJ039A      Develop specifications and prepare drawings for HVAC/R projects**

### **Unit Descriptor**

**1)**

This unit covers specification development and documentation of HVAC/R projects. It encompasses safe working practices, following a design brief, applying knowledge heating, ventilation, air conditioning and/or refrigeration systems to selecting system components, operating within established project budget and developing project specifications and design drawings.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ028A      Produce HVAC/R design drawings

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to develop specifications and prepare drawings

- 1.1 OHS processes and procedures for a given work area are identified, identified, obtained and understood
- 1.2 The extent of the project is established from design brief and/or other relevant documentation and from discussions with appropriate person(s).
- 1.3 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved in the work
- 1.4 Software tools and equipment a needed for the work are obtained in accordance with established procedures

2 Develop specifications and prepare drawings

- 2.1 Sources of components and materials needed for the project are established and selected for their availability, suitability for purpose and cost in accordance with organisation policies and procedures.
- 2.2 Specifications are developed that include the necessary performance requirements for components and system.
- 2.3 Risk management strategies for the project are sought and obtained for incorporating in the specification.
- 2.4 Appropriate software tools are used to develop specifications and produce drawing based on standard protocols.
- 2.5 Project specifications and drawings are reviewed against all inputs and adjusted to rectify any anomalies.
- 2.6 Project specifications and drawings are documented in accordance with organisation policies and procedures.

	2.7	Solutions to unplanned situation are provided consistent with organisation's policy.	
	2.8	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards	
3	Obtain approval for specifications and drawings.	3.1	Project specifications and drawings are presented and discussed with person(s) of higher authority.
		3.2	Alterations to the project specifications and drawings resulting from the presentation / discussion are negotiated with person(s) of higher authority within the constraints of organisation's policy.
		3.3	Final project specifications and drawings are documented and approval obtained from appropriate person(s).

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing specifications and preparing drawings for HVAC/R projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.11.2 Specification development

2.16.15 Computer aided drafting

2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to developing specifications and preparing drawings for at least two different HVAC/R projects for at least two different HVAC/R projects.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Develop specifications and prepare drawings for HVAC/R projects as described in 7) and including:

- A Determining the project requirements accurately
- B Establishing source and availability of components appropriately
- C Including the performance requirements of components and the system and risk management strategies in the specifications
- D Negotiating alterations to the project specifications and drawings successfully
- E Documenting project specifications and drawings in accordance with organisation policies and procedures

- F Obtaining approval for the completed project specifications and drawings
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in developing specifications and preparing drawings for HVAC/R projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.6; 3.1 to 3.3	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.2; 2.1	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 3.1; 3.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.6	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.1; 3.2	3

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.3	2
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3; 3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEJ040A Manage refrigeration and air conditioning projects

### Unit Descriptor

1)

This unit covers the management of refrigeration and air conditioning projects involving design, modifications, installation, and/or maintenance of systems and equipment. It encompasses covers management of safety, budget, variation, personnel, resources, and critical path timelines all necessary progress and completion documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher..

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Refrigeration and Air Conditioning

### ELEMENT

### PERFORMANCE CRITERIA

5)	Elements describe the essential outcomes of a unit		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1	Establish the scope of the project.	1.1	OHS processes and procedures for a given work area are identified, identified, obtained and understood
		1.2	Project' deliverables and budget are established from project planning and other relevant documentation and from discussions with appropriate person(s).
		1.3	Measurable outcomes are identifies to evaluate the project on completion from project planning and other relevant documentation.
		1.4	Plant, materials and skills needed to meet project outcome are established from project planning and other relevant documentation.
		1.5	Processes and procedures are developed for managing contract variations from discussions with appropriate person(s) and in accordance with contractual agreement.
2	Manage project.	2.1	OHS policies, procedures and programs are implemented and monitored.
		2.2	Achievement of project outcomes is delegated to appropriately competent persons involved in the project.
		2.3	Risk events are identified and project plan strategies implemented to ensure that outcomes are achieved to the required standard of quality specified in the contract and safety required by organization's policy.
		2.4	Procurement processes and procedures are monitored to ensure on time supply of plant and materials and in accordance with organisation's policy.
		2.5	Project is progress is monitored against schedule, quality requirements and budget.
		2.6	Conflict issues at the work site and between stakeholders, clients and regulators are identified and managed in accordance with organisation's policy.

- |   |                   |   |   |
|---|-------------------|---|---|
|   | 2.7               | Variations are managed in accordance with agreed processes and in accordance with the contract.         |   |
|   | 2.8               | Project records are maintained and progress reports written and forwarded to all appropriate person(s). |   |
| 3 | Complete project. | 3.1   | Project outcomes are reviewed against original plan, implemented risk strategies, contract variations, safety record and budget.      |
|   |                   | 3.2   | Project completion acceptance is sought from appropriate person(s) and hand-over documented in accordance with organisation's policy. |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and managing refrigeration and air conditioning projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |  |
|--|----------|--|
|  | 2.2.17   | Project management   |
|  | 2.2.19   | Customer/Client relations  |
|  | 2.2.31   | Refrigeration and air conditioning industry sector customs and practices |
|  | 2.18.8.2 | Occupational Health and Safety, enterprise responsibilities              |

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to managing an industry accepted medium sized refrigeration or air conditioning project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified

in the performance criteria and range statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Manage refrigeration and air conditioning projects as described in 7) and including:

- A Establishing the scope of the project accurately,
- B Ascertaining the input a project
- C Developing effective management processes,
- D Managing resources and variations effectively
- E Resolving conflicts
- F Adopting risk management strategies
- G Maintaining records and submitting progress reports
- H Meeting project outcomes
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in managing refrigeration and air conditioning projects

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.2 to 1.4; 2.6 to 2.8	3

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3; 2.5; 2.7; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>
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1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.3; 2.7; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.8; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEJ041A Design complex commercial refrigeration system

### Unit Descriptor

1)

This unit covers the design of complex commercial refrigeration systems. It encompasses applying knowledge of complex commercial refrigeration systems, safety and regulatory requirements, developing alternative design schemes based on a design brief and customer requirements and documenting system designs.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ032A Design commercial refrigeration systems

UEENEEJ038A Analyse noise, vibration and thermodynamic parameters of refrigeration and air conditioning systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.3. Prerequisites.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1	Prepare to design complex commercial refrigeration system	<p>1.1 OHS processes and procedures for a given work area are identified, identified, obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the proposed refrigeration system is determined from the design brief or in consultations with appropriate person(s).</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.</p>
2	Design complex commercial refrigeration system	<p>2.1 Knowledge of commercial refrigeration processes and methods are applied to the design.</p> <p>2.2 Alternative concepts for the design are evaluated based on the requirements outlined in the design brief. (See Note)</p> <p>2.3 Safety, functional and budget considerations are incorporated in the design.</p> <p>2.4 System design draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.5 System design is documented for submission to appropriate person(s) for approval.</p> <p>2.6 Solutions to unplanned situation are provided consistent with organisation’s policy.</p>
3	Obtain approval for complex commercial refrigeration system design	<p>3.1 System design is presented and explained to client representative and/or other relevant person(s).</p> <p>3.2 Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation’s policy.</p>

- 3.3 Final design is documented and approval obtained from appropriate person(s).
- 3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

Note.

Design concepts should be evaluated by real or virtual prototyping where it cannot be shown easily by other means that particular aspects of the design met specified requirements.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing a complex commercial refrigeration system. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.17.26 Commercial refrigeration system design

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing a commercial refrigeration system incorporating multiple major components (i.e. compressors, condenser or evaporators) circuits or systems and associated components and controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:

Design a complex commercial refrigeration system as described in 7) and including:

- A Developing outlines of alternative designs
- B Developing the design within the safety, regulatory, functional requirements and budget limitations
- C Documenting and presenting design effectively
- D Successfully negotiating design alteration requests
- E Obtaining approval for final design
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in designing a complex commercial refrigeration system.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and

incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEJ040A Prepare complex HVAC or refrigeration system proposals

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 2.6; 3.2	3

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	3
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**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEJ042A **Design complex industrial refrigeration systems**

### **Unit Descriptor**

1)

This unit covers the design of complex industrial refrigeration systems. It encompasses applying knowledge of industrial refrigeration systems, safety and regulatory requirements, developing alternative design schemes based on a design brief and customer requirements and documenting system designs.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ033A      Design industrial refrigeration systems

UEENEEJ038A      Analyse noise, vibration and thermodynamic parameters of refrigeration and air conditioning systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

**Licence to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to design complex commercial refrigeration system

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of the proposed refrigeration system is determined from the design brief or in consultations with appropriate person(s).
- 1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.

2 Design complex commercial refrigeration system

- 2.1 Knowledge of industrial refrigeration system, processes and methods are applied to the design.
- 2.2 Alternative concepts for the design are evaluated based on the requirements outlined in the design brief. (See Note)
- 2.3 Safety, functional and budget considerations are incorporated in the design.
- 2.4 System design draft is checked for compliance with the design brief and regulatory requirements.
- 2.5 System design is documented for submission to appropriate person(s) for approval.
- 2.6 Solutions to unplanned situation are provided consistent with organisation’s policy.

- |   |  |     |  |
|---|--|-----|--|
| 3 | Obtain approval for complex commercial refrigeration system design | 3.1 | System design is presented and explained to client representative and/or other relevant person(s).                               |
|   |  | 3.2 | Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation’s policy.   |
|   |  | 3.3 | Final design is documented and approval obtained from appropriate person(s).   |
|   |  | 3.4 | Quality of work is monitored against personal performance agreement and/or established organizational or professional standards. |

Note.

Design concepts should be evaluated by real or virtual prototyping where it cannot be shown easily by other means that particular aspects of the design met specified requirements.

### **REQUIRED SKILLS AND KNOWLEDGE**

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing complex industrial refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.17.23.2 Industrial refrigeration system design

2.18.1 Occupational Health and Safety principles

### **RANGE STATEMENT**

- 7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing a complex industrial refrigeration system incorporating multiple major components (i.e. compressors, condenser or evaporators) circuits or systems and associated components and controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

- 8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified

- in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Design complex industrial refrigeration systems as described in 7) and including:
      - A Developing outlines of alternative designs
      - B Developing the design within the safety, regulatory, functional requirements and budget limitations
      - C Documenting and presenting design effectively
      - D Successfully negotiating design alteration requests
      - E Obtaining approval for final design
      - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in designing

complex industrial refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6



## UEENEEJ043A Design complex air conditioning systems

### Unit Descriptor

1)

This unit covers the design of complex air conditioning systems. It encompasses applying knowledge of complex air conditioning systems, safety and regulatory requirements, developing alternative design schemes based on a design brief and customer requirements and documenting system designs.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ034A Design heating, ventilation and air conditioning (HVAC) systems

UEENEEJ038A Analyse noise, vibration and thermodynamic parameters of refrigeration and air conditioning systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Refrigeration and Air Conditioning

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Prepare to design complex commercial refrigeration system	1.1	OHS processes and procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	The extent of the proposed refrigeration system is determined from the design brief or in consultations with appropriate person(s).
		1.4	Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.
2	Design complex commercial refrigeration system	2.1	Knowledge of complex air conditioning processes and methods are applied to the design.
		2.2	Alternative concepts for the design are evaluated based on the requirements outlined in the design brief. (See Note)
		2.3	Safety, functional and budget considerations are incorporated in the design.
		2.4	System design draft is checked for compliance with the design brief and regulatory requirements.
		2.5	System design is documented for submission to appropriate person(s) for approval.
		2.6	Solutions to unplanned situation are provided consistent with organisation's policy.
3	Obtain approval for complex commercial refrigeration system design	3.1	System design is presented and explained to client representative and/or other relevant person(s).
		3.2	Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation's policy.

- 3.3 Final design is documented and approval obtained from appropriate person(s).
- 3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

Note.

Design concepts should be evaluated by real or virtual prototyping where it cannot be shown easily by other means that particular aspects of the design met specified requirements.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing complex air conditioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.17.2 HVAC load estimating
- 2.17.27 Air conditioning system design
- 2.17.28 Psychometrics - advanced
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing a complex air conditioning system incorporating multiple major components (i.e. air handling plant, compressors, condenser or evaporators) circuits or systems and associated components and controls.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best

utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile

- graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
    - Design complex air conditioning systems as described in 7) and including:
      - A Developing outlines of alternative designs
      - B Developing the design within the safety, regulatory, functional requirements and budget limitations
      - C Documenting and presenting design effectively
      - D Successfully negotiating design alteration requests
      - E Obtaining approval for final design
      - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in designing complex air conditioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 2.6; 3.2	3

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	3
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEJ044A Design mechanical ventilation/exhaust systems

### Unit Descriptor

1)

This unit covers the design of mechanical ventilation/exhaust systems. It encompasses applying knowledge mechanical ventilation/exhaust systems, safety and regulatory requirements, developing alternative design schemes based on a design brief and customer requirements and documenting system designs.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ034A Design heating, ventilation and air conditioning (HVAC) systems

UEENEEJ038A Analyse noise, vibration and thermodynamic parameters of refrigeration and air conditioning systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field** 4)

Refrigeration and Air Conditioning

**ELEMENT****PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1	Prepare to design complex commercial refrigeration system	1.1	OHS processes and procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	The extent of the proposed refrigeration system is determined from the design brief or in consultations with appropriate person(s).
		1.4	Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.
2	Design complex commercial refrigeration system	2.1	Knowledge of mechanical ventilation/exhaust processes and methods are applied to the design.
		2.2	Alternative concepts for the design are evaluated based on the requirements outlined in the design brief. (See Note)
		2.3	Safety, functional and budget considerations are incorporated in the design.
		2.4	System design draft is checked for compliance with the design brief and regulatory requirements.
		2.5	System design is documented for submission to appropriate person(s) for approval.
		2.6	Solutions to unplanned situation are provided consistent with organisation's policy.
3	Obtain approval for complex commercial refrigeration system design	3.1	System design is presented and explained to client representative and/or other relevant person(s).
		3.2	Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation's policy.

- 3.3 Final design is documented and approval obtained from appropriate person(s).
- 3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

Note.

Design concepts should be evaluated by real or virtual prototyping where it cannot be shown easily by other means that particular aspects of the design met specified requirements.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing mechanical ventilation/exhaust systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.17.29 Exhaust systems design

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different mechanical ventilation and exhaust systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in

a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design mechanical ventilation/exhaust systems as described in 7) and including:
    - A Developing outlines of alternative designs
    - B Developing the design within the safety, regulatory, functional requirements and budget limitations
    - C Documenting and presenting design effectively
    - D Successfully negotiating design alteration requests
    - E Obtaining approval for final design
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in designing mechanical ventilation/exhaust systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and

demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**  
Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	3

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	3

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.6

## UEENEEJ045A Design hydronic systems

### Unit Descriptor

1)

This unit covers the design of hydronic systems. It encompasses applying knowledge of hydronic systems, safety and regulatory requirements, developing alternative design schemes based on a design brief and customer requirements and documenting system designs..

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ038A	Analyse noise, vibration and thermodynamic parameters of refrigeration and air conditioning systems
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### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

## Refrigeration and Air Conditioning

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<b>5)</b> Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to design complex commercial refrigeration system	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 The extent of the proposed refrigeration system is determined from the design brief or in consultations with appropriate person(s).</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.</p>
2 Design complex commercial refrigeration system	<p>2.1 Knowledge of hydronic systems, processes and methods are applied to the design.</p> <p>2.2 Alternative concepts for the design are evaluated based on the requirements outlined in the design brief. (See Note)</p> <p>2.3 Safety, functional and budget considerations are incorporated in the design.</p> <p>2.4 System design draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.5 System design is documented for submission to appropriate person(s) for approval.</p> <p>2.6 Solutions to unplanned situation are provided consistent with organisation's policy.</p>
3 Obtain approval for complex commercial refrigeration system design	<p>3.1 System design is presented and explained to client representative and/or other relevant person(s).</p> <p>3.2 Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation's policy.</p> <p>3.3 Final design is documented and approval obtained from appropriate person(s).</p>

- 3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

Note.

Design concepts should be evaluated by real or virtual prototyping where it cannot be shown easily by other means that particular aspects of the design met specified requirements.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing hydronic systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.20 HVAC hydronic systems
- 2.17.30 Heating systems design
- 2.17.31 Hydronic systems design
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

- 7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different hydronic systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

- 8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in

a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design hydronic systems as described in 7) and including:
    - A Developing outlines of alternative designs
    - B Developing the design within the safety, regulatory, functional requirements and budget limitations
    - C Documenting and presenting design effectively
    - D Successfully negotiating design alteration requests
    - E Obtaining approval for final design
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in designing hydronic systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and

demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.4; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEJ046A Design complex control systems for heating, ventilation, air conditioning or refrigeration systems**

### **Unit Descriptor**

1)

This unit covers the design of complex control systems for heating, ventilation, air conditioning or refrigeration system. It encompasses applying knowledge of complex control systems for a heating, ventilation, air conditioning or refrigeration system, safety and regulatory requirements, developing alternative design schemes based on a design brief and customer requirements and documenting system designs.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ035A	Design control systems for a heating, ventilation, air conditioning or refrigeration system
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### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Refrigeration and Air Conditioning

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Prepare to design complex commercial refrigeration system	1.1	OHS processes and procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	The extent of the proposed refrigeration system is determined from the design brief or in consultations with appropriate person(s).
		1.4	Design development work is planned to meet scheduled timelines in consultation with others involved on the work site.
2	Design complex commercial refrigeration system	2.1	Knowledge of complex control processes and methods are applied to the design.
		2.2	Alternative concepts for the design are evaluated based on the requirements outlined in the design brief. (See Note)
		2.3	Safety, functional and budget considerations are incorporated in the design.
		2.4	System design draft is checked for compliance with the design brief and regulatory requirements.
		2.5	System design is documented for submission to appropriate person(s) for approval.
		2.6	Solutions to unplanned situation are provided consistent with organisation's policy.
3	Obtain approval for complex commercial refrigeration system design	3.1	System design is presented and explained to client representative and/or other relevant person(s).
		3.2	Requests for alterations to the design are negotiated with relevant person(s) within the constraints of organisation's policy.

- 3.3 Final design is documented and approval obtained from appropriate person(s).
- 3.4 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

Note.

Design concepts should be evaluated by real or virtual prototyping where it cannot be shown easily by other means that particular aspects of the design met specified requirements.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing complex control systems for heating, ventilation, air conditioning or refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.17 Refrigeration/HVAC direct digital controls
- 2.15.18 Refrigeration/HVAC pneumatic controls
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different complex control systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to

include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design complex control systems for heating, ventilation, air conditioning or refrigeration systems as described in 7) and including:
    - A Developing outlines of alternative designs
    - B Developing the design within the safety, regulatory, functional requirements and budget limitations
    - C Documenting and presenting design effectively
    - D Successfully negotiating design alteration requests
    - E Obtaining approval for final design
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in designing complex control systems for heating, ventilation, air conditioning or refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEJ035A Design control systems for a heating, ventilation, air conditioning or refrigeration system

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1; 3.2	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.3	3
How are problem solving skills	Refer to the following Performance Criteria for examples of application:	

applied?	2.1 to 2.4; 2.6; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.3	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 3.2
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.2; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEJ047A Audit energy use for commercial HVAC/R systems

### Unit Descriptor

1)

This unit covers assessing the energy used by commercial HVAC/R systems in relation to its performance for the purpose of improving efficiency and/or certification as meeting energy efficiency standards. It encompasses safe working practices, determining efficiency requirements, setting up performance and energy tests, evaluating results and documenting test outcomes.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ036A Evaluate and report on energy management

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to audit energy use for a commercial HVAC/R application

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 System assessment and testing area is checked for safety hazards and risk control measures implemented in strict accordance with safety policy and procedures.
- 1.4 Relevant documentation is obtained and read to determine the performance/certification requirements against which the system is to be assessed.

Note:  
Examples of documentation are those specifying safety requirements, technical standard and as marketed technical energy performance

- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety.

2 Audit energy use for a commercial HVAC/R application

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Circuits/apparatus/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.3 In depth knowledge of the performance and energy efficiency requirements of HVAC/R system and assessment methods are applied to the audit process.

- |   |  |   |
|---|--|---|
|   | 2.4                                      | Apparatus assessment and tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny.                        |
|   | 2.5                                      | System assessment and tests are carried out methodically and results and comments systematically noted.   |
|   | 2.6                                      | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   | 2.7                                      | Auditing is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practices.                              |
| 3 | Document auditing activities and results | 3.1 OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2 Work site is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3 Assessment and test results are evaluated and non-compliance issues identified.   |
|   |  | 3.4 Assessment, test results and recommendations on non-compliance issues are documented and reported to appropriate person(s) in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and auditing energy use for commercial HVAC/R systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.16.12.2 Energy management

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to auditing energy use by at least two different commercial HVAC/R systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Audit energy use for commercial HVAC/R systems as described in 7) and including:
    - A Interpreting performance/certification requirements correctly.
    - B Setting up and conducting appropriate system assessments and tests.
    - C Identifying non-compliance issues.
    - D Reporting assessment and test results and non-compliance issues and recommendations appropriately.
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in auditing energy use for commercial HVAC/R systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4; 2.4; 3.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5; 3.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.4; 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.5 to 2.8

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEJ048A Audit HVAC/R control systems for compliance with standards and regulations

### Unit Descriptor

1)

This unit covers control safety and performance evaluation of heating, ventilating, air conditioning and refrigeration control systems across their operating range. It encompasses working safely, setting up and conducting evaluation measurements, evaluating performance from measured parameters and documenting results and recommending any resulting corrective actions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ035A	Design control systems for a heating, ventilation, air conditioning or refrigeration system
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### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to audit energy use for a commercial HVAC/R application

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Examination and testing area is checked for safety hazards and risk control measures implemented in strict accordance with safety policy and procedures.
- 1.4 Relevant documentation is obtained and read to determine the performance/certification requirements against which the system is to be assessed.

Note:

Examples of documentation are those specifying safety requirements, technical standard and as marketed technical performance, product quality endorsement standards .

- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety.

2 Audit HVAC/R control systems for compliance with standards and regulations.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- |   |   |  |
|---|---|--|
|   | 2.3   | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.  |
|   | 2.4   | In depth knowledge of the performance and energy efficiency requirements of HVAC/R system and assessment methods are applied to the audit process.                 |
|   | 2.5   | Control system examination and tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny.           |
|   | 2.6   | Control system examination and tests are carried out methodically and results and comments systematically noted.   |
|   | 2.7   | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   | 2.8   | Assessment is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practices.                     |
| 3 | Complete auditing work and document results | 3.1 OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2 Work site is cleaned and made safe in accordance with established procedures.  |
|   |   | 3.3 Examination and test results are evaluated and non-compliance issues identified.   |
|   |   | 3.4 Examination, test results and comments on non-compliance issues are documented and reported to appropriate person(s) in accordance with established procedures |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and auditing HVAC/R control systems for compliance with standards and regulations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.15.22 HVAC control systems

2.16.5 Refrigeration and air conditioning installations, testing and verification methods

2.16.13 Building management systems

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to at least two different types of HVAC/R control systems encompassing at least four different control scenarios.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational

requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Audit HVAC/R control systems for compliance with standards and regulations as described in 7) and including:
    - A Interpreting compliance documents
    - B Setting up and conducting appropriate examinations and tests
    - C Identifying non-compliance defects
    - D Reporting examination and test results and non-compliance issues clearly and accurately

**Context of and specific 8.3)**

**resources for assessment**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in auditing HVAC/R control systems for compliance with standards and regulations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	3

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4; 2.5	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEJ049A      **Develop specifications for heat exchanger designs**

### **Unit Descriptor**

**1)**

This unit covers the analysis of refrigeration parameters and develop specification for heat exchanger design. It encompasses working safely, apply extensive knowledge of refrigeration parameters, gathering and analysing data, developing and documenting results and solutions for use in design work.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ038A	Analyse noise, vibration and thermodynamic parameters of refrigeration and air conditioning systems
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### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to develop specifications for exchanger designs

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of analysis to develop specifications is determined from design brief and situation reports and in consultations with relevant persons
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Effective strategies are formed to ensure analysis is carried out efficiently.

2 Develop specifications for exchanger designs.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of refrigeration parameters are applied to developing heat exchanger specifications.
- 2.3 Parameters and performance requirements in relation to refrigeration systems are obtained in accordance with established procedures.
- 2.4 Approaches to analysing refrigeration parameters are carried out to provide the most effective solution.
- 2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.
- 2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards

3 Document specifications for exchanger design

- 3.1 Analysis is documented including details of all findings, calculations and assumptions.

- 3.2 Specification for heat exchanger are developed from analysis findings and in accordance with established procedures
- 3.3 Developed specification and analysis is reported to appropriately person(s) for endorsement.
- 3.4 Justification for findings and any actions to be undertaken in relation to the design is documented for inclusion in work/project or development records in accordance with professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing specifications for heat exchanger designs. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.17.18.2 Thermodynamics

2.17.18.3 Heater exchanger designs

2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to developing specifications for at least two different heat exchangers.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best

utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile

- graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop specifications for heat exchanger designs as described in 7) and including:
    - A Interpreting compliance documents
    - B Setting up and conducting appropriate examinations and tests
    - C Identifying non-compliance defects
    - D Reporting examination and test results and non-compliance issues clearly and accurately

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in developing specifications for heat exchanger designs.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units****8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEEJ050A Evaluate alternative and new technologies applicable to electrotechnology applications**

### **Unit Descriptor**

**1)**

This unit covers evaluation of alternative and new technologies applicable to electrotechnology applications. It encompasses working safely, comparing manufacturer's technical data for alternative or new technologies with specifications for a proposed project, conducting evaluation tests, evaluating systems/components from technical data, calculations and/or measured parameters and reporting findings for use in design work.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit shall be assessed in conjunction with other Units covering specific technologies in an Electrotechnology Advanced Diploma qualification.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of refrigeration or air conditioning work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such

as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to evaluate and report on alternative and new technologies

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of evaluation is determined from proposed project specifications and discussion with appropriate personnel.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Tools, testing devices, and manufacture’s technical data needed to carry out the work are obtained and checked for correct operation and safety.

2 Evaluate alternative and new technologies.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 In-depth knowledge of the electrotechnology discipline applicable to the alternative or new technology being considered is applied to the evaluation process.
- 2.3 Manufacture’s technical data for alternative or new technologies is compared with proposed project specifications, budget and regulations.
- 2.4 Evaluation tests, where used, are set up in strict accordance with OHS requirements and established test methods for each particular component under scrutiny.
- 2.5 Evaluation is carried out methodically and results and comments systematically noted.

		2.6	Unexpected situations are dealt with safely and with the approval of an authorised person.
		2.7	Evaluation is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practices.
3	Report on use of alternative and new technologies	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Where applicable, the work site is cleaned and made safe in accordance with established procedures.
		3.3	Results of the evaluation are documented for use in design work including recommendations and justifications for adoption or rejection of the alternative and new technologies evaluated.
		3.4	Report is forwarded to appropriate person(s) for endorsement.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and evaluating alternative and new technologies applicable to electrotechnology applications. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.17.32	Sources of technical development and processes for their adoption
2.18.1	Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to evaluating alternative and new technologies for two different proposed projects in any of the following electrotechnology disciplines.

- Automated systems
- Computer systems
- Electrical
- Electronics
- Industrial electronics and control
- Refrigeration and air conditioning
- Renewable energy

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence

decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Evaluating alternative and new technologies applicable to electrotechnology applications as described in 7) and including:
    - A Determining the extent of the evaluation.
    - B Comparing manufacture’s technical data for alternative or new technologies with proposed project specifications, budget and regulations accurately.
    - C Reporting evaluation including recommendations and justifications for adoption or rejection of the

alternative and new technologies evaluated.

- D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in evaluating alternative and new technologies applicable to electrotechnology applications.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEJ051A **Service small appliances and power tools**

### **Unit Descriptor**

**1)**

This unit covers maintaining the effective and efficient operation of small appliances and power tools. It encompasses working safely, applying knowledge of small appliances and power tools, following service manuals, testing appliance function, locating and rectifying faults and defective components and completing the necessary service documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEE002A	Dismantle, assemble and fabricate electrotechnology components
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### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit may apply to persons entering work in electrotechnology and may be used in school based vocational programs.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting

equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.  
 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to service small appliances and power tools

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the repair is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are accessed in accordance with established routines and procedures.
- 1.6 Tools, apparatus and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Service small appliances and power tools

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Apparatus is dismantled in accordance with manufacturer’s guide and supervisor’s instructions.

		2.5	Component parts are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage.
		2.6	Repairs are affected efficiently without damage to other components, apparatus or circuits.
		2.7	Apparatus is assembled in an appropriate sequence with all parts placed, secured and connected in accordance with manufacturer’s guide or industry practice.
		2.8	Procedures for referring non-routine events to immediate supervisor for directions are followed.
		2.9	Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3	Complete and report service work activities.	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Repaired apparatus is prepared and forwarded to appropriate person(s) for testing.
		3.3	Work area is cleaned and made safe in accordance with established procedures.
		3.4	Work supervisor is notified of the completion of the repair work in accordance with established procedures.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and servicing small appliances and power tools. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.6.25	Hand power tool repairs
2.15.7	Small appliance repair
2.18.1	Occupational Health and Safety principles
2.18.13	Appliance servicing safe working practice

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to servicing at least two different small appliances and two different power tools. These include the following:

- Small appliances: Toasters, garbage disposal units, food mixer/processors, small heating appliances (e.g. hair dryers), range hoods, etc.
- Hand Power Tools: Drills (pistol, hammer, cordless, screw driver), circular saws, mitre saws, routers, sanders, grinders, planers, cut off machines, heat guns, etc.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational

requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Service small appliances and power tools as described in 7) and including:
    - A Following manufactures service instructions for access to components
    - B Removing at least three different types of components specified in the work instructions
    - C Replacing components to manufacturers' requirements.
    - D Terminating internal wiring correctly.

- E Reassembling the apparatus correctly
- F Testing apparatus operation
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in servicing small appliances and power tools.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills

enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## UEENEEJ052A Carry out repairs to appliance refrigeration systems

### Unit Descriptor

1)

This unit covers the repairing appliance refrigeration systems refrigerated appliances. It encompasses working safely, following service manuals, locating and replacing faulty refrigeration components, evacuating and recharging refrigerant and completing service reports.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEE002A	Dismantle, assemble and fabricate electrotechnology components
UEENEEE005A	Fix and secure equipment
UEENEEE007A	Use drawings, diagrams, schedules and manuals
UEENEEJ003A	Determine the basic operating conditions of vapour compression systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It is suitable for augmenting previously acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where appliances are connected to fixed wiring at voltage above 50 V a.c. or 120 V

d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for servicing refrigeration or air conditioning appliance in particular when working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to carry out repairs to appliance refrigeration systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The nature of the repair is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials/parts that may be required for the work are established in accordance with established routines and procedures.
- 1.6 Tools, apparatus and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Carry out repairs to appliance

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.

refrigeration systems	2.2	Routine operational tests of the refrigeration system are conducted to identify fault and locate component.	
	2.3	Appliance is checked as being isolated where necessary in strict accordance OHS requirements and procedures	
	2.4	Refrigeration system is evacuated and refrigerant recovered in accordance with regulatory requirements and industry codes.	
	2.5	System is dismantled as necessary to replace faulty component in accordance with manufacturer’s service manual and industry standards and codes	
	2.6	Component parts are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage.	
	2.7	Replacement component/parts are obtained in accordance with established routine procedures.	
	2.8	Apparatus is assembled in an appropriate sequence with replacement component/parts in accordance with manufacturer’s service manual and industry standards and codes.	
	2.9	Refrigeration system is recharged and any leaks rectified in accordance with regulatory requirements and industry codes.	
	2.10	Procedures for referring non-routine events to immediate supervisor for directions are followed.	
	2.11	Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.	
3	Complete repairs and report	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work area is cleaned and made safe in accordance with established procedures.
		3.3	Service report is completed and verified by an appropriate person in accordance with established routine procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out repairs to appliance refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.8 Appliance refrigeration systems
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices
- 2.18.13 Appliance servicing safe working practice

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to carrying out repairs to appliance refrigeration systems of at least two different refrigerated appliances.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### **Overview of Assessment**

##### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be

required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out repairs to appliance refrigeration systems as described in 7) and including:
    - A Determining the nature of the repair

- B Identifying and locating faulty components through routine operational tests
- C Evacuating system and recovering refrigerant in accordance with regulations
- D Dismantling and assembling system/components effectively
- E Recharging refrigeration system in accordance with regulations
- F Testing appliance functions effectively
- G Completing service report accurately
- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in carrying out repairs to appliance refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.4; 2.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.5; 1.6; 2.2 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5; 2.6

## UEENEEJ053A Find and rectify faults in appliance motors and associated controls

### Unit Descriptor

1)

This unit covers finding and repairing faults in appliance motors and associated controls. It encompasses working safely, applying knowledge of appliance motor systems and their controls, reading circuit diagrams, sketching diagrams from traced circuits, applying logical fault finding procedures, conducting repairs and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEE002A	Dismantle, assemble and fabricate electrotechnology components
UEENEEE003A	Solve problems in extra-low voltage single path circuits
UEENEEE005A	Fix and secure equipment
UEENEEE007A	Use drawings, diagrams, schedules and manuals
UEENEEJ008A	Recover, pressure and leak test, evacuate and charge refrigerants

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also be used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where appliances are connected to fixed wiring at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for servicing refrigeration or air conditioning appliance in particular when working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and rectify faults

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |   |      |   |
|---|---|------|---|
| 2 | Find and repair faults                                    | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |   | 2.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures                   |
|   |   | 2.3  | Appliance is checked as being correctly isolated where necessary in strict accordance OHS requirements and procedures   |
|   |   | 2.4  | Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.             |
|   |   | 2.5  | Fault finding is approached methodically drawing on knowledge of appliance motor systems and their controls using measured and calculated values of circuit/motor parameters. |
|   |   | 2.6  | Appliance is dismantled where necessary and parts stored to protect them against loss or damage   |
|   |   | 2.7  | Suspected faulty motor, component or circuit circuits is rechecked and its fault status confirmed.  |
|   |   | 2.8  | Replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.  |
|   |   | 2.9  | Effectiveness of the repair is tested in accordance with established procedures.  |
|   |   | 2.10 | Apparatus is reassembled, finally tested and prepared for return to service.  |
|   |   | 2.11 | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |   | 2.12 | Fault finding and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.    |
| 3 | Completion and report fault finding and repair activities | 3.1  | OHS work completion risk control measures and procedures are followed.  |
|   |   | 3.2  | Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares inventory.   |

- 3.3 Maintenance work activities are documented in accordance with established procedures. (See Note)

Note.

Examples of documentation are component faults reports, test results, authorisations, permits, parts/component dispatch and stores records.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and rectifying faults in appliance motors and associated controls. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.1 Protection devices and applications
- 2.6.26 Appliance motors and circuits
- 2.11.5 Basic electrical testing and measuring devices and techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

- 7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to finding and repairing the following faults, in single and/or three phase appliance motors and associated controls in each of three different types of appliances/systems:

- Open-circuit
- Short-circuit
- Incorrect connections
- Insulation failure
- Unsafe condition
- Motor component failure
- Control circuit component failure
- Related mechanical failure

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and rectify faults in appliance motors and associated controls as described in 7) and including:
    - A Envisaging the likely extent of work from fault/breakdown reports and discussion with appropriate person(s)
    - B Using methodical fault finding techniques
    - C Finding faults efficiently
    - D Rectifying faults effectively
    - E Completing documentation correctly
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in finding and rectifying faults in appliance motors and associated controls

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.4 to 2.8

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## **UEENEEJ054A Find and rectify faults in appliance control devices and systems**

### **Unit Descriptor**

**1)**

This unit covers finding and repairing faults in appliance control systems and devices. It encompasses working safely, applying knowledge of appliance control systems and devices, reading circuit diagrams, sketching diagrams from traced circuits, applying logical fault finding procedures, conducting repairs and completing the necessary service documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ053A	Find and rectify faults in appliance motors and associated controls
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### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where appliances are connected to fixed wiring at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for servicing refrigeration or air conditioning appliance in particular when working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and rectify faults

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Find and repair faults

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Appliance is checked as being correctly isolated where necessary in strict accordance OHS requirements and procedures

- 2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.
  - 2.5 Fault finding is approached methodically drawing on knowledge of appliance control systems and devices using measured and calculated values of circuit/control parameters.
  - 2.6 Appliance is dismantled where necessary and parts stored to protect them against loss or damage
  - 2.7 Suspected faulty control device, component or circuit is rechecked and its fault status confirmed.
  - 2.8 Replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.
  - 2.9 Effectiveness of the repair is tested in accordance with established procedures.
  - 2.10 Apparatus is reassembled, finally tested and prepared for return to service.
  - 2.11 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.12 Fault finding and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault finding and repair activities
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares inventory.
  - 3.3 Maintenance work activities are documented in accordance with established procedures. (See Note)

Note.

Examples of documentation are component faults reports, test results, authorisations, permits, parts/component dispatch and stores records.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and rectifying faults in appliance control devices and systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.3.15	Appliances, controls and communications basics
2.11.9.4	Appliance diagnostic tools
2.18.1	Occupational Health and Safety principles
2.18.3.1	Refrigeration and air conditioning safe working practices
2.18.13	Appliance servicing safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to finding and repairing any four of the following faults in appliance control systems and devices in each of two different types of appliance.

- Open-circuit
- Short-circuit
- Incorrect connections
- Insulation failure
- Unsafe condition
- Motor component failure
- Control circuit component failure
- Related mechanical failure

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and rectify faults in appliance control devices and systems as described in 7) and including:
    - A Envisaging the likely extent of work from fault/breakdown reports and discussion with appropriate person(s)
    - B Using methodical fault finding techniques
    - C Finding faults efficiently
    - D Rectifying faults effectively
    - E Completing documentation correctly
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in finding and rectifying faults in appliance control devices and systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEJ055A      **Service refrigerated appliances**

### **Unit Descriptor**

**1)**

This unit covers maintaining the effective and efficient operation of refrigerated appliances. It encompasses working safely, applying knowledge of refrigerated appliance, following service manuals, testing appliance function, locating and rectifying faults and defective components and completing the necessary service documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ054A	Find and rectify faults in appliance control systems
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UEENEEJ062A	Recover, pressure and leak test, evacuate and charge refrigerants/appliances
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### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where appliances are connected to fixed wiring at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for servicing refrigeration or air conditioning appliance in particular when

working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to service refrigerated appliances

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The extent of work to be undertaken is determined from service/fault request and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials/parts that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Service refrigerated appliances

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

- |   |   |  |
|---|---|--|
|   | 2.3   | Appliance is checked as being correctly isolated where necessary in strict accordance OHS requirements and procedures  |
|   | 2.4   | Safety hazards resulting from the defect or fault are documented and risk control measures devised and implemented in consultation with appropriate personnel.   |
|   | 2.5   | Appliances are tested for efficient operation and components affecting efficiency are inspected for wear or defects in accordance with standards, manufacturer’s service manuals and industry codes of practice. |
|   | 2.6   | Appliance faults and their cause are identified through the application of refrigerated appliances and using measured and calculated values of appliance parameters.   |
|   | 2.7   | Appliance is dismantled where necessary and parts stored to protect them against loss or damage  |
|   | 2.8   | Defective, worn or faulty appliance components are rechecked and their status confirmed.   |
|   | 2.9   | Replacement parts required to rectify defects/faults are sourced and obtained in accordance with established procedures.   |
|   | 2.10  | Effectiveness of the repair is tested in accordance with established procedures.   |
|   | 2.11  | Apparatus is reassembled, finally tested and prepared for return to service.   |
|   | 2.12  | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   | 2.13  | Servicing activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.  |
| 3 | Completion and report fault finding and repair activities | 3.1 OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2 Work area is cleaned and made safe in accordance with established procedures.  |
|   |   | 3.3 Service report is completed and verified by an appropriate person in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and rectifying faults in appliance control devices and systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.8 Domestic appliance principles
- 2.15.9.1 Appliance refrigeration systems
- 2.15.9.2 Capillary systems
- 2.15.9.3 Retrofitting domestic refrigeration systems
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices
- 2.18.13 Appliance servicing safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to servicing refrigerated appliances with any four of the following defects/faults in appliance refrigeration system in each of two different types of appliance.

- Higher energy use than previously experienced
- Not cold enough
- Appliance ices-up
- Appliance light not working
- Electric shock received from appliance cabinet

The types of refrigeration appliances include: single door refrigerators, two door refrigerators/freezers and single door freezers in either cyclic defrost or frost free.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### **Overview of Assessment**

#### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### **Critical aspects of evidence required to**

#### **8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Find and rectify faults in appliance control devices and systems as described in 7) and including:
    - A Determining the nature of the work from service request
    - B Identifying defective components affecting appliance efficiency
    - C Finding faults efficiently
    - D Rectifying defects/faults effectively
    - E Testing appliance functions effectively
    - F Completing service report accurately
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and  
specific  
resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice

**assessment** using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in finding and rectifying faults in appliance control devices and systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEJ056A Service clothes washers and dryers

### Unit Descriptor

1)

This unit covers maintaining the effective and efficient operation of clothes washers and dryers. It encompasses working safely, applying knowledge of clothes washers and dryers, following service manuals, testing appliance function, locating and rectifying faults and defective components and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ054A	Find and rectify faults in appliance control systems
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### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where appliances are connected to fixed wiring at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for servicing clothes washes and dryers. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and

typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

#### **Competency Field 4)**

#### Refrigeration and Air Conditioning

#### **ELEMENT**

#### **PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to service clothes washers and dryers.

1.1 OHS procedures for a given work area are identified, obtained and understood

1.2 OHS risk control measures and procedures in preparation for the work are followed.

1.3 The extent of work to be undertaken is determined from service/fault request and/or discussions with appropriate person(s).

1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.

1.5 Sources of materials/parts that may be required for the work are established in accordance with established procedures.

1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Service clothes washes and dryers.

2.1 OHS risk control measures and procedures for carrying out the work are followed.

2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

2.3 Appliance is checked as being correctly isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Safety hazards resulting from the defect or fault are documented and risk control measures devised and implemented in consultation with appropriate personnel.
  - 2.5 Appliances are tested for efficient operation and components affecting efficiency are inspected for wear or defects in accordance with standards, manufacturer’s service manuals and industry codes of practice.
  - 2.6 Appliance faults and their cause are identified through the application of refrigerated appliances and using measured and calculated values of appliance parameters.
  - 2.7 Appliance is dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.8 Defective, worn or faulty appliance components are rechecked and their status confirmed.
  - 2.9 Replacement parts required to rectify defects/faults are sourced and obtained in accordance with established procedures.
  - 2.10 Effectiveness of the repair is tested in accordance with established procedures.
  - 2.11 Apparatus is reassembled, finally tested and prepared for return to service.
  - 2.12 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.13 Servicing activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault finding and repair activities.
    - 3.1 OHS work completion risk control measures and procedures are followed.
    - 3.2 Work area is cleaned and made safe in accordance with established procedures.
    - 3.3 Service report is completed and verified by an appropriate person in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and servicing clothes washers and dryers. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.8 Domestic appliance principles
- 2.15.10 Clothes washers and dryers
- 2.18.1 Occupational Health and Safety principles
- 2.18.13 Appliance servicing safe working practice

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to servicing clothes washers and dryers with any four of the following defects/faults in appliance clothes washers and dryer systems in each of two different types of appliance.

- Washers
  - Higher energy use than previously experienced
  - Not cold enough
  - Appliance ices-up
  - Appliance light not working
  - Electric shock received from appliance cabinet
- Dryers
  - Heater not operating
  - Fan not working
  - Timer not working correctly
  - Electric shock received from appliance cabinet

The types of appliances include:

- Washing machines: Automatic washers (top load and front load), twin tub washers, washer/dryer combinations
  - Clothes Dryers: Tumble and static

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

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## **Critical aspects of evidence required to**

### **8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Service clothes washers and dryers as described in 7) and including:
    - A Determining the nature of the work from service request
    - B Identifying defective components affecting appliance efficiency
    - C Finding faults efficiently
    - D Rectifying defects/faults effectively
    - E Testing appliance functions effectively
    - F Completing service report accurately
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and  
specific  
resources for**
**8.3)**

This unit should be assessed as it relates to normal work practice

**assessment** using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in servicing clothes washers and dryers.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.4; 2.12; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEJ057A Service electric heating appliances

### Unit Descriptor

1)

This unit covers maintaining the effective and efficient operation of electric heating appliances. It encompasses working safely, applying knowledge of electric heating appliances, following service manuals, testing appliance function, locating and rectifying faults and defective components and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ054A	Find and rectify faults in appliance control systems
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### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where appliances are connected to fixed wiring at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for servicing electric heating appliances. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to service electric heating appliances.

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The extent of work to be undertaken is determined from service/fault request and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials/parts that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Service electric heating appliances.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Appliance is checked as being correctly isolated where necessary in strict accordance OHS requirements and procedures.

- |  |  |  |     |  |  |     |   |  |     |  |
|--|--|--|-----|--|--|-----|---|--|-----|--|
| 2.4  | Safety hazards resulting from the defect or fault are documented and risk control measures devised and implemented in consultation with appropriate personnel.   |  |     |  |  |     |   |  |     |  |
| 2.5  | Appliances are tested for efficient operation and components affecting efficiency are inspected for wear or defects in accordance with standards, manufacturer’s service manuals and industry codes of practice.   |  |     |  |  |     |   |  |     |  |
| 2.6  | Appliance faults and their cause are identified through the application of refrigerated appliances and using measured and calculated values of appliance parameters.   |  |     |  |  |     |   |  |     |  |
| 2.7  | Appliance is dismantled where necessary and parts stored to protect them against loss or damage.   |  |     |  |  |     |   |  |     |  |
| 2.8  | Defective, worn or faulty appliance components are rechecked and their status confirmed.   |  |     |  |  |     |   |  |     |  |
| 2.9  | Replacement parts required to rectify defects/faults are sourced and obtained in accordance with established procedures.   |  |     |  |  |     |   |  |     |  |
| 2.10   | Effectiveness of the repair is tested in accordance with established procedures.   |  |     |  |  |     |   |  |     |  |
| 2.11   | Apparatus is reassembled, finally tested and prepared for return to service.   |  |     |  |  |     |   |  |     |  |
| 2.12   | Unexpected situations are dealt with safely and with the approval of an authorised person.   |  |     |  |  |     |   |  |     |  |
| 2.13   | Servicing activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.  |  |     |  |  |     |   |  |     |  |
| 3  | <table border="0"> <tr> <td style="vertical-align: top; padding-right: 20px;">Completion and report fault finding and repair activities.</td> <td style="vertical-align: top;">3.1</td> <td style="vertical-align: top;">OHS work completion risk control measures and procedures are followed.</td> </tr> <tr> <td></td> <td style="vertical-align: top;">3.2</td> <td style="vertical-align: top;">Work area is cleaned and made safe in accordance with established procedures.</td> </tr> <tr> <td></td> <td style="vertical-align: top;">3.3</td> <td style="vertical-align: top;">Service report is completed and verified by an appropriate person in accordance with established procedures.</td> </tr> </table> | Completion and report fault finding and repair activities.   | 3.1 | OHS work completion risk control measures and procedures are followed. |  | 3.2 | Work area is cleaned and made safe in accordance with established procedures. |  | 3.3 | Service report is completed and verified by an appropriate person in accordance with established procedures. |
| Completion and report fault finding and repair activities. | 3.1  | OHS work completion risk control measures and procedures are followed.                                       |     |  |  |     |   |  |     |  |
|  | 3.2  | Work area is cleaned and made safe in accordance with established procedures.                                |     |  |  |     |   |  |     |  |
|  | 3.3  | Service report is completed and verified by an appropriate person in accordance with established procedures. |     |  |  |     |   |  |     |  |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and servicing electric heating appliances. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.27.1 Electric heating appliances
- 2.18.1 Occupational Health and Safety principles
- 2.18.13 Appliance servicing safe working practice

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to servicing electric heating appliances with any three of the following defects/faults in electric heating systems in each of two different types of appliance.

- Heater not operating
- Fan not working
- Timer not working correctly
- Electric shock received from appliance cabinet

The types of appliances include: Electric stoves, ovens, hot plates and ranges, space heaters, and hot water systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Service electric heating appliances as described in 7) and including:
    - A Determining the nature of the work from service request
    - B Identifying defective components affecting appliance efficiency
    - C Finding faults efficiently
    - D Rectifying defects/faults effectively
    - E Testing appliance functions effectively
    - F Completing service report accurately
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in servicing

electric heating appliances.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.4; 2.12; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11



## UEENEEJ058A Service dish washing machines

### Unit Descriptor

1)

This unit covers maintaining the effective and efficient operation of dish washing machines. It encompasses working safely, applying knowledge of dish washing machines, following service manuals, testing appliance function, locating and rectifying faults and defective components and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ054A	Find and rectify faults in appliance control systems
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### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where appliances are connected to fixed wiring at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for servicing dish washing machines. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and

typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to service dish washing machines.

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The extent of work to be undertaken is determined from service/fault request and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials/parts that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Service dishwashing machines.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Appliance is checked as being correctly isolated where necessary in strict accordance OHS requirements and procedures.

- 2.4 Safety hazards resulting from the defect or fault are documented and risk control measures devised and implemented in consultation with appropriate personnel.
  - 2.5 Appliances are tested for efficient operation and components affecting efficiency are inspected for wear or defects in accordance with standards, manufacturer’s service manuals and industry codes of practice.
  - 2.6 Appliance faults and their cause are identified through the application of refrigerated appliances and using measured and calculated values of appliance parameters.
  - 2.7 Appliance is dismantled where necessary and parts stored to protect them against loss or damage.
  - 2.8 Defective, worn or faulty appliance components are rechecked and their status confirmed.
  - 2.9 Replacement parts required to rectify defects/faults are sourced and obtained in accordance with established procedures.
  - 2.10 Effectiveness of the repair is tested in accordance with established procedures.
  - 2.11 Apparatus is reassembled, finally tested and prepared for return to service.
  - 2.12 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.13 Servicing activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Completion and report fault finding and repair activities.
- 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work area is cleaned and made safe in accordance with established procedures.
  - 3.3 Service report is completed and verified by an appropriate person in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and servicing dish washing machines. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.11 Dishwashing machines
- 2.18.1 Occupational Health and Safety principles
- 2.18.13 Appliance servicing safe working practice

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to servicing dish washing machines with any four of the following defects/faults in the dish washing machine system in each of two different types of appliance.

- Not enough or too much water entering machine
- No wash cycle
- No rinse cycle
- Heater not operating
- Timer not working correctly
- Electric shock received from appliance cabinet

The types of dish washing machines include: Automatic washers, side load, front load, and semi-automatic.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

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#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Service dish washing machines as described in 7) and including:
    - A Determining the nature of the work from service request
    - B Identifying defective components affecting appliance efficiency
    - C Finding faults efficiently
    - D Rectifying defects/faults effectively
    - E Testing appliance functions effectively
    - F Completing service report accurately
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and  
specific  
resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice

**assessment** using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in servicing dish washing machines.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.4; 2.12; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of	Refer to the following Performance Criteria for examples of application:

	the context of the work task	1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEJ059A Service gas appliances

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers maintaining the effective and efficient operation of gas appliances. It encompasses working safely, applying knowledge of the gas appliance, following service manuals, testing appliance function, locating and rectifying faults and defective components and completing the necessary service documentation.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed</p> <p>UEENEEJ054A      Find and rectify faults in appliance control systems</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">3</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.</p>						
<b>Licence to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit require a licence to practise in the workplace where appliances are connected to fixed wiring at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for servicing gas appliances. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.</p> <p>Note:</p> <p>1. Compliance with permits may be required in various jurisdictions and</p>						

typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Prepare to service gas appliances.	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	OHS risk control measures and procedures in preparation for the work are followed.
		1.3	The extent of work to be undertaken is determined from service/fault request and/or discussions with appropriate person(s).
		1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
		1.5	Sources of materials/parts that may be required for the work are established in accordance with established procedures.
		1.6	Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.
2	Service gas appliances.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
		2.3	Appliance is checked as being correctly isolated where necessary in strict accordance OHS requirements and procedures.

- |   |  |  |  |
|---|--|--|--|
|   | 2.4  | Safety hazards resulting from the defect or fault are documented and risk control measures devised and implemented in consultation with appropriate personnel.   |  |
|   | 2.5  | Appliances are tested for efficient operation and components affecting efficiency are inspected for wear or defects in accordance with standards, manufacturer’s service manuals and industry codes of practice. |  |
|   | 2.6  | Appliance faults and their cause are identified through the application of refrigerated appliances and using measured and calculated values of appliance parameters.   |  |
|   | 2.7  | Appliance is dismantled where necessary and parts stored to protect them against loss or damage.   |  |
|   | 2.8  | Defective, worn or faulty appliance components are rechecked and their status confirmed.   |  |
|   | 2.9  | Replacement parts required to rectify defects/faults are sourced and obtained in accordance with established procedures.   |  |
|   | 2.10   | Effectiveness of the repair is tested in accordance with established procedures.   |  |
|   | 2.11   | Apparatus is reassembled, finally tested and prepared for return to service.   |  |
|   | 2.12   | Unexpected situations are dealt with safely and with the approval of an authorised person.   |  |
|   | 2.13   | Servicing activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.  |  |
| 3 | Completion and report fault finding and repair activities. | 3.1  | OHS work completion risk control measures and procedures are followed.                                       |
|   |  | 3.2  | Work area is cleaned and made safe in accordance with established procedures.                                |
|   |  | 3.3  | Service report is completed and verified by an appropriate person in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and servicing dish washing machines. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.12 Gas appliances
- 2.18.1 Occupational Health and Safety principles
- 2.18.13 Appliance servicing safe working practice

### **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to servicing gas appliances with any four of the following defects/faults in appliance gas system in each of two different types of appliance.

- No pilot flame
- No main jet ignition
- Not hot enough
- Timer not working correctly
- Electric shock received from appliance cabinet
- Gas leaking

The types of gas appliances include: Stoves, ovens, hot plates and ranges, space heaters, and hot water systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

#### **Overview of Assessment**

##### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships.

However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling

employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Service dish washing machines as described in 7) and including:
    - A Determining the nature of the work from service request
    - B Identifying defective components affecting appliance efficiency
    - C Finding faults efficiently
    - D Rectifying defects/faults effectively
    - E Testing appliance functions effectively
    - F Completing service report accurately
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in servicing dish washing machines.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and

incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.4; 2.12; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2

### Skills Enabling Employment 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## UEENEEJ060A Service room air conditioners

### Unit Descriptor

1)

This unit covers maintaining the effective and efficient operation of room air conditioners. It encompasses working safely, applying knowledge of room air conditioners, following service manuals, testing appliance function, locating and rectifying faults and defective components and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ054A	Find and rectify faults in appliance control systems
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UEENEEJ062A	Recover, pressure and leak test, evacuate and charge refrigerants/appliances
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### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where appliances are connected to fixed wiring at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for servicing air conditions. Practice in workplace and during training is also subject to regulations directly related to occupational

health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field**

**4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to service room air conditioners.

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 The extent of work to be undertaken is determined from service/fault request and/or discussions with appropriate person(s).
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials/parts that may be required for the work are established in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety.

2 Service room air conditioners.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- |   |  |  |
|---|--|--|
|   | 2.3  | Appliance is checked as being correctly isolated where necessary in strict accordance OHS requirements and procedures.   |
|   | 2.4  | Safety hazards resulting from the defect or fault are documented and risk control measures devised and implemented in consultation with appropriate personnel.   |
|   | 2.5  | Appliances are tested for efficient operation and components affecting efficiency are inspected for wear or defects in accordance with standards, manufacturer’s service manuals and industry codes of practice. |
|   | 2.6  | Appliance faults and their cause are identified through the application of refrigerated appliances and using measured and calculated values of appliance parameters.   |
|   | 2.7  | Appliance is dismantled where necessary and parts stored to protect them against loss or damage.   |
|   | 2.8  | Defective, worn or faulty appliance components are rechecked and their status confirmed.   |
|   | 2.9  | Replacement parts required to rectify defects/faults are sourced and obtained in accordance with established procedures.   |
|   | 2.10   | Effectiveness of the repair is tested in accordance with established procedures.   |
|   | 2.11   | Apparatus is reassembled, finally tested and prepared for return to service.   |
|   | 2.12   | Unexpected situations are dealt with safely and with the approval of an authorised person.   |
|   | 2.13   | Servicing activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.  |
| 3 | Completion and report fault finding and repair activities. | 3.1 OHS work completion risk control measures and procedures are followed.   |
|   |  | 3.2 Work area is cleaned and made safe in accordance with established procedures.  |
|   |  | 3.3 Service report is completed and verified by an appropriate person in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and servicing room air conditioners. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.15.13 Room air conditioners
- 2.17.4 Air conditioning fundamentals
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.2 Split air conditioning systems safe working practices
- 2.18.13 Appliance servicing safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to servicing room air conditioners with any four of the following defects/faults in appliance refrigeration system in each of two different types of appliance.

- Higher energy use than previously experienced
- Not cooling/heating enough.
- Fan not operating
- Appliance noisy
- Electric shock received from appliance cabinet

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Service room air conditioners as described in 7) and including:
    - A Determining the nature of the work from service request
    - B Identifying defective components affecting appliance efficiency
    - C Finding faults efficiently
    - D Rectifying defects/faults effectively
    - E Testing appliance functions effectively
    - F Completing service report accurately
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in servicing room air conditioners.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.4; 2.12; 3.3	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11

## **UEENEEJ061A      Verify compliance and functionality of appliances**

### **Unit Descriptor**

**1)**

This unit covers testing and visually inspecting appliances to verifying that they are safe and comply with requirements. It encompasses procedures for conducting safety and functionality tests, conducting visual inspections, identifying non-compliance defects, documenting results and recommendations and initiating the rectification of any defect.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Competency in this unit shall be assessed only after all other core units and nominated elective units have been achieved.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

**4)**

Refrigeration and Air Conditioning

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to verify compliance and functionality of appliances	<p>1.1 OHS procedures for a given work area are identified, identified, obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.</p> <p>1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site</p> <p>1.5 Inspection and tests are appropriately sequenced in accordance with job schedule.</p> <p>1.6 Materials needed for the tests and verification are obtained in accordance with established procedures and checked against job requirements</p> <p>1.7 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety</p>
2 Visually inspect appliances	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Appliances are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.3 Accessories and components are validated as being appropriately rated and meeting functional requirements.</p> <p>2.4 Evidence that equipment complies with safety and functional requirements is cited.</p> <p>2.5 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.</p> <p>2.6 Unexpected situations are dealt with safely and with the approval of an authorised person.</p>

- |   |   |     |   |
|---|---|-----|---|
|   |   | 2.7 | Inspection is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Conduct tests                               | 3.1 | OHS risk control measures and procedures for carrying out the work are followed.  |
|   |   | 3.2 | Testing or measuring on a live and operating system in strict accordance with OHS requirements and within established safety procedures                                     |
|   |   | 3.3 | Appliances are checked as being isolated in strict accordance OHS requirements and procedures   |
|   |   | 3.4 | Electrical tests are conducted to verify that the electrical circuit within the appliance is safe and function as intended.   |
|   |   | 3.5 | Refrigeration tests are conducted to verify that the refrigeration components and pipe work within the appliance is safe and functions as intended.                         |
|   |   | 3.6 | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.   |
|   |   | 3.7 | Unexpected situations are dealt with safely and with the approval of an authorised person.  |
|   |   | 3.8 | Testing is carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.    |
| 4 | Report inspection and verification findings | 4.1 | OHS work completion risk control measures and procedures are followed.  |
|   |   | 4.2 | Appliance is cleaned and made safe in accordance with established procedures.   |
|   |   | 4.3 | Non-compliance defects are identified and reported in accordance with established procedures.   |
|   |   | 4.4 | Recommendations for rectifying defects are made in accordance with established procedures.  |
|   |   | 4.5 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures   |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying compliance and functionality of appliances. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.15.14	Appliance, testing and compliance verification methods
2.18.1	Occupational Health and Safety principles
2.18.3.1	Refrigeration and air conditioning safe working practices
2.18.13	Appliance servicing safe working practice

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to servicing room air conditioners with any four of the following defects/faults in appliance refrigeration system in each of two different types of appliance.

- Visual inspection of appliances
- Conducting all electrical tests

Note:

1. Electrical testing include isolation testing; insulation resistance of equipment; resistance of the internal circuits of equipment; polarity of supply and equipment; continuity of earthing; correct electrical connections load current.
2. Electrical testing may be limited by the scope permitted under restricted electrical work

- Conducting all refrigeration tests

Note:

Refrigeration testing includes pressure test apparatus/circuits; leak test apparatus/circuits; evacuation test apparatus/circuits; compressor efficiency; controls tests; refrigerant charge; operating pressures; system operation system capacity

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Verify compliance and functionality of appliances as described in 7) and including:
    - A Identifying visual defects
    - B Conducting all electrical tests safely and correctly
    - C Conducting all refrigeration tests safely and correctly
    - D Identifying non-compliant defects from test results
    - E Recommending appropriate corrective actions
    - F Acting within regulatory limits
    - G Reporting legibly and accurately
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in verifying compliance and functionality of appliances.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3 to 4.5	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.5; 1.6; 2.3 to 2.6; 3.4; 3.5	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 3.4; 3.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  4.4	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  3.4; 3.5	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3 to 4.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.8; 2.1; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7; 2.8; 3.7; 3.8

## **UEENEEJ062A Recover, pressure and leak test, evacuate and charge refrigerants — appliances**

### **Unit Descriptor**

**1)**

This unit covers the recovery of refrigerants from appliances, pressure and leak testing evacuation and charging refrigerants in appliances. It encompasses working safely and to standards, following regulations and industry practices for handling refrigerants and completing the necessary documentation.

Note:

Refrigeration systems may be those used for refrigerating or for air conditioning.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ002A Prepare refrigerant tubing and fittings

UEENEEJ003A Determine the basic operating conditions of refrigeration and air conditioning systems.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training and may be used to augment other electrotechnology qualifications at AQF 3 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit may, in some States/Territories, require a licence to practise in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in workplace and during training is also subject to regulations directly related to

occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to recover refrigerants, pressure and leak test, evacuate and charge refrigeration appliance.

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The nature and location of the work is determined from documentation or appropriate person(s) to establish the scope of work to be undertaken.
- 1.5 The work is appropriately sequenced in accordance with job schedule
- 1.6 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.7 Refrigerants, lubricants and cleaning materials needed for the work are obtained in accordance with established procedures and checked against job requirements
- 1.8 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety

- |   |  |      |  |
|---|--|------|--|
|   |  | 1.9  | Preparatory work is checked to ensure no damage has occurred and complies with requirements  |
| 2 | Recover refrigerants, pressure and leak test, evacuate and charge refrigeration appliance. | 2.1  | OHS risk control measures and procedures for carrying out the work are followed.   |
|   |  | 2.2  | Checks are carried out to ensure the system or component parts are isolated, when necessary, in strict accordance with OHS requirements and procedures |
|   |  | 2.3  | Circuits/machines/plant are checked as being electrically isolated where necessary in strict accordance OHS requirements and procedures                |
|   |  | 2.4  | Refrigerants are removed from a appliance safely into suitably labelled containers in accordance with regulatory requirements and industry practices.  |
|   |  | 2.5  | Precautions are taken to prevent damage to components while pressure testing the appliance.  |
|   |  | 2.6  | Pressure testing is conducted at a pressure compatible with the refrigerant to be used.  |
|   |  | 2.7  | Leaks are located and rectified using testing methods appropriate to the appliance under test and in accordance with industry practices.               |
|   |  | 2.8  | Appliances are evacuated to the required level and cleaned the appliance of all moisture and other containments in accordance with industry practices. |
|   |  | 2.9  | A ‘Drop test’ is used to prove effectiveness of the evacuation in accordance with industry practice.   |
|   |  | 2.10 | Components lubricants are checked and maintained in accordance with manufacturer’s requirements.   |
|   |  | 2.11 | Appliances are charged with the appropriate refrigerant in accordance with manufacturer’s requirements and industry practices.                         |
|   |  | 2.12 | Problematic situations that arise during the work are dealt with in an appropriate manner.   |

	2.13	Appliances are pressure and leak tested, evacuated and charged efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3	Complete and report refrigerants recovery, pressure and leak test and evacuate and charge work	3.1 OHS work completion risk control measures and procedures are followed.
	3.2	Work site and equipment is cleaned and made safe in accordance with established procedures.
	3.3	Contaminated refrigerant is dealt with in accordance with legislative/regulatory requirements.
	3.4	Completion of the work is documented and an appropriate person or persons notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and recovering, pressure and leak testing, evacuating and charging refrigerants — appliances. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.16.7	High pressure refrigerant installation
2.17.2.3	Appliance refrigerants
2.17.3	Refrigeration systems and compressor operations
2.18.1	Occupational Health and Safety principles
2.18.3.1	Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to testing and charging refrigeration appliances used for refrigeration or air conditioning encompassing the following:

- Recovering refrigerant from an existing appliance that may contain contaminants

- Pressure and leak testing a newly installed or repaired appliance
- Evacuating a appliance in preparation for charging with refrigerant
- Charging an appliance with refrigerant with minimal loss.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Recover, pressure and leak test, evacuate and charge refrigerants — appliances as described in 7) and including:
    - A Selecting appropriate materials and equipment
    - B Removing and storing refrigerant correctly
    - C Conducting pressure testing at the appropriate pressure level and without damaging components
    - D Locating and rectifying leaks
    - E Evacuating the system to the required level
    - F Charging the system with the appropriate refrigerant
    - G Completing the necessary documentation.
    - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in recovering, pressure and leak testing, evacuating and charging refrigerants — appliances.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.9	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.7; 2.12	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.11	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4 to 2.9
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.12

## **UEENEEJ063A Analyse the psychrometric and thermodynamic performance of HVAC/R systems**

### **Unit Descriptor**

**1)**

This unit covers the analysis of heating, ventilating, air conditioning and refrigeration (HVAC/R) systems to provide solution to psychrometric and thermodynamic performance issues. It encompasses working safely, apply extensive knowledge of psychrometric and thermodynamic parameters, gathering and analysing data, applying problem solving techniques, developing and documenting results and solutions for use in design work.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

There are no prerequisite competencies to this unit.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training or institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1	Prepare to analyse the psychrometric and thermodynamic performance of HVAC/R systems	1.1	OHS processes and procedures for a given work area are identified, identified, obtained and understood
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	The extent of the psychrometric and thermodynamic issues are determined from performance specifications and situation reports and in consultations with relevant persons
		1.4	Activities are planned to meet scheduled timelines in consultation with others involved in the work.
		1.5	Effective strategies are formed to ensure solution development and implementation is carried out efficiently.
2	Analyse the psychrometric and thermodynamic performance of HVAC/R systems	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Knowledge of psychrometric and thermodynamic principles are applied to analytical solutions to refrigeration and air conditioning systems.
		2.3	Parameters, specifications and performance requirements in relation to refrigeration and air conditioning systems are obtained in accordance with established procedures.
		2.4	Approaches to analysing psychrometric and thermodynamic parameters are carried out to provide the most effective solution.
		2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.

	2.6	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards
3	Document and report on the results of the psychrometric and thermodynamic performance analysis and actions taken.	3.1 Solutions to psychrometric and thermodynamic issues are evaluated to determine their effectiveness and modified where necessary.
	3.2	Analysis is documented including details of all findings, calculations and assumptions.
	3.3	Analysis is reported to appropriately personnel to establish appropriate action to be taken based on findings.
	3.4	Justification for findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and analysing the psychrometric and thermodynamic performance of HVAC/R systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.33 Refrigeration systems
- 2.17.34 Air conditioning systems
- 2.17.35 Applied psychometrics
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to analysing psychrometric and thermodynamic parameters in at least two different refrigeration and air conditioning systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Analyse the psychrometric and thermodynamic performance of HVAC/R systems as described in 7) and including:
    - A Understanding the psychrometric and thermodynamic performance issues
    - B Forming effective strategies for analysing refrigeration and air conditioning systems performance
    - C Obtaining psychrometric and thermodynamic performance parameters, specifications and performance requirements appropriate to each situation.
    - D Evaluating the results of the analysis
    - E Documenting analysis details of all findings, calculations and assumptions.

- F Documenting justification of actions to be implemented in accordance with professional standards.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in analysing the psychrometric and thermodynamic performance of HVAC/R systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this

Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5
6	Performing the work task in non-	Refer to the following Performance Criteria for examples of application:

	routine or contingent situations	2.5
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## UEENEEJ064A Analyse the operation of HVAC/R systems

### Unit Descriptor

1)

This unit covers the analysis the operating parameters of heating, ventilating, air conditioning and refrigeration (HVAC/R) systems to determine whether performance requirements are being met. It encompasses working safely, apply knowledge of operating parameters, gathering and analysing data, applying problem solving techniques, developing and documenting results and solutions for use in design work..

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ063A Analyse the psychrometric performance of HVAC/R systems

OR

UEENEEJ009A Verify compliance and functionality of refrigeration and air conditioning installations

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended to augment formally acquired competencies and is suitable for institutional based delivery. It applies to any formal recognition for this standard at the aligned AQF 6 level.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to

occupational health and safety, codes of work practice and standard work procedures related to the operation of automated machinery.

**Competency Field**

**4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to analyse the operation of HVAC/R systems

- 1.1 OHS processes and procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of operating analysis is determined from performance specifications and situation reports and in consultations with relevant persons
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
- 1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.

2 Analyse the operation of HVAC/R systems

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Knowledge of HVAC/R system operating parameters is applied to analytical solutions to refrigeration and air conditioning systems.
- 2.3 Parameters, specifications and performance requirements in relation to HVAC/R systems are obtained in accordance with established procedures.
- 2.4 Approaches to analysing operating parameters are carried out to provide the most effective solution.
- 2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.
- 2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards

3	Document and report on the results of the operation of HVAC/R systems analysis and actions taken.	3.1	Results of system operating analysis are evaluated to determine whether performance requirements are being met.
		3.2	Analysis is documented including details of all findings, calculations and assumptions.
		3.3	Analysis is reported to appropriately personnel to establish appropriate action to be taken based on findings.
		3.4	Justification for findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with professional standards.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and analysing the operation of HVAC/R systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.15.19	HVAC air systems
2.15.20	HVAC hydronic systems
2.16.16	Refrigeration System Components and Piping
2.17.36	Ventilation systems
2.18.1	Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to analysing operating parameters in at least two different HVAC/R systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Analyse the operation of HVAC/R systems as described in 7) and including:
    - A Understanding the operating performance
    - B Forming effective strategies for analysing refrigeration and air conditioning systems performance
    - C Obtaining operating parameters, specifications and performance requirements appropriate to each situation.
    - D Evaluating the results of the analysis
    - E Documenting analysis details of all findings, calculations and assumptions.
    - F Documenting justification of actions to be

implemented in accordance with professional standards.

- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in analysing the operation of HVAC/R systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## **UEENEEJ065A Evaluate fluid and thermodynamic parameters of refrigeration systems**

### **Unit Descriptor**

**1)**

This unit covers evaluation of fluid and thermodynamic parameters of refrigeration systems. It encompasses working safely, setting up and conducting evaluation measurements, evaluating fluid and thermodynamic parameters from measured parameters and reporting results for use in design work.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ027A Determine thermodynamic parameters of refrigeration and air conditioning systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training . It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of refrigeration or air conditioning work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to evaluate fluid and thermodynamic parameters of refrigeration systems

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 The extent of evaluation is determined from specifications for the refrigeration system and discussion with appropriate personnel.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety.

2 Evaluate fluid and thermodynamic parameters of refrigeration systems.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 In-depth knowledge of the fluid and thermodynamic parameters is applied to the evaluation process
- 2.4 Energy evaluation tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny.
- 2.5 Fluid and thermodynamic parameters evaluation tests are carried out methodically and results and comments systematically noted.

		2.6	Unexpected situations are dealt with safely and with the approval of an authorised person.
		2.7	Evaluation is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practices.
3	Report on evaluation of fluid and thermodynamic parameters of refrigeration systems	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Results of fluid and thermodynamic parameters evaluation are documented for use in design work
		3.4	Energy evaluation report is forwarded to appropriate person(s) for endorsement.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and analysing the operation of HVAC/R systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.14.2 Refrigeration engineering advanced mathematics
- 2.17.18.1 Thermodynamics fundamentals
- 2.17.19 Fluid mechanics fundamentals
- 2.18.1 Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to evaluating and reporting fluid and thermodynamic parameters at least two different types of refrigeration systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

### EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## **Overview of Assessment**

### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

## **Critical aspects of evidence required to**

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### **8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Analyse the operation of HVAC/R systems as described in 7) and including:
    - A Determining the extent of the evaluation
    - B Setting up and conducting appropriate examinations and tests
    - C Documenting evaluation results for use in design work
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in analysing the operation of HVAC/R systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3; 1.4; 2.5 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7
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## UEENEEJ066A Solve problems in dairy refrigeration systems

### Unit Descriptor

1)

This unit covers solving problems in dairy refrigeration systems. It encompasses working safely and to standards, applying knowledge of the components and operation of dairy refrigeration systems, using effective problem solving techniques and documenting solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEJ011A Diagnose and rectify faults in refrigeration and air conditioning components and systems

UEENEEJ013A Commission refrigeration and air conditioning systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1 Prepare to solve problems in dairy refrigeration systems	<p>1.1 OHS procedures for a given work area are identified, identified, obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work.</p> <p>1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.</p> <p>1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.6 Sources of materials that may be required for the work are accessed in accordance with established procedures.</p> <p>1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety</p>
2 Solve problems in dairy refrigeration systems	2.1 OHS risk control measures and procedures for carrying out the work are followed.

- |   |   |  |
|---|---|--|
|   | 2.2   | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures  |
|   | 2.3   | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures   |
|   | 2.4   | Problems are approached methodically drawing on operational knowledge of dairy refrigeration systems using observation, measurement, calculations and comparison with normal operating values of system and components.  |
|   | 2.5   | Information needed to solve problems is gathered and evaluated against normal operating parameters.<br><br>Note:<br>Examples of information needed to solve problems are system specifications, as-installed drawings, maintenance and service records and measured and calculated values of component operating parameters. |
|   | 2.6   | Problems are dealt with safely and with the approval of an authorised person.  |
|   | 2.7   | Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.   |
| 3 | Complete work and document problem solving activities | 3.1 OHS risk control work completion measures and procedures are followed.   |
|   |   | 3.2 Work site is cleaned and made safe in accordance with established procedures.  |
|   |   | 3.3 Justification for solutions used to solve problems is documented   |
|   |   | 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in dairy refrigeration systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

### 2.17.10.2 Dairy refrigeration systems

- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in solving at least three operational problems related to dairy refrigeration systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to

its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in dairy refrigeration systems as described in 7) and including:
    - A Using methodical problem solving techniques
    - B Accessing relevant information
    - C Solving problems effectively
    - D Providing written justification for the solutions used
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in solving problems in dairy refrigeration systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE009A	Carry out scheduled maintenance
UEENEEJ006A	Install pipe work for refrigeration and air conditioning systems
UEENEEJ007A	Install refrigeration and air conditioning systems, major components and associated equipment
UEENEEJ010A	Select refrigerant piping and associated accessories and controls

UEENEE011A	Diagnose and rectify faults in refrigeration and air conditioning components and systems
UEENEEJ013A	Commission refrigeration and air conditioning systems
UEENEEP007A	Locate and rectify faults in electrical low voltage equipment following prescribed procedures

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.6	2
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**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7

## UEENEEJ067A **Solve problems in central plant air conditioning systems**

### **Unit Descriptor**

1)

This unit covers solving problems in central plant air conditioning systems. It encompasses working safely and to standards, applying knowledge of the components and operation of central plant systems, using effective problem solving techniques and documenting solutions.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ011A Diagnose and rectify faults in refrigeration and air conditioning components and systems

UEENEEJ013A Commission refrigeration and air conditioning systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical devices, site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to solve problems in central plant air conditioning systems

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve problems in central plant air conditioning systems

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

- |   |   |  |
|---|---|--|
|   | 2.3   | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures   |
|   | 2.4   | Problems are approached methodically drawing on operational knowledge of dairy refrigeration systems using observation, measurement, calculations and comparison with normal operating values of system and components.  |
|   | 2.5   | Information needed to solve problems is gathered and evaluated against normal operating parameters.<br><br>Note:<br>Examples of information needed to solve problems are system specifications, as-installed drawings, maintenance and service records and measured and calculated values of component operating parameters. |
|   | 2.6   | Problems are dealt with safely and with the approval of an authorised person.  |
|   | 2.7   | Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.   |
| 3 | Complete work and document problem solving activities | 3.1 OHS risk control work completion measures and procedures are followed.   |
|   |   | 3.2 Work site is cleaned and made safe in accordance with established procedures.  |
|   |   | 3.3 Justification for solutions used to solve problems is documented   |
|   |   | 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in central plant air conditioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |          |   |
|----------|---|
| 2.17.5   | Central plant air conditioning                            |
| 2.18.1   | Occupational Health and Safety principles                 |
| 2.18.3.1 | Refrigeration and air conditioning safe working practices |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in solving at least three operational problems related to central plant air conditioning systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for

Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in central plant air conditioning systems as described in 7) and including:
    - A Using methodical problem solving techniques
    - B Accessing relevant information
    - C Solving problems effectively
    - D Providing written justification for the solutions used
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in solving problems in central plant air conditioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE009A                      Carry out scheduled maintenance

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information	Refer to the following Performance Criteria for examples of application:	

communicated within this competency?	4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7

## UEENEEJ068A **Maintain microbial control of air and water systems**

### **Unit Descriptor**

1)

This unit covers the quality assurance and risk management compliance processes for maintenance of the air and water systems associated with refrigeration and air conditioning. It encompasses working safely and to technical, quality and risk management standards, work specifications and maintenance schedules, sample inspections, evaluating components and completing the necessary maintenance documentation.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

There are no prerequisite competencies to this unit.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit apply to any qualification in this standard at an AQF 2 level.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit require a licence to practise in the work place where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. Where refrigeration and air conditioning are involved practice in the workplace is subject to Federal/State/Territory regulations covering public health and the relevant codes of practice; in some jurisdictions a licence is required.

Practice in the workplace is also subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

**Competency Field**

4)

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to maintain microbial control of air and water systems.

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The maintenance schedule and process compliance requirements are confirmed and work appropriately sequenced in accordance with established procedures.
- 1.5 Appropriate person(s) are consulted to ensure the work is coordinated effectively with others involved on the work site.
- 1.6 Location equipment to be maintained is determined from maintenance schedule procedures and/or system specifications and diagrams.
- 1.7 Resources needed to conduct the maintenance is obtained in accordance with established procedures and checked against job requirements.
- 1.8 Tools, equipment and testing devices needed to conduct the maintenance are obtained in accordance with established procedures and checked for correct operation and safety.

2 Maintain microbial control of air and water systems.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.3 Water samples are taken and tested in accordance with established methods and routines.

- |   |  |   |
|---|--|---|
|   | 2.4  | Apparatus to be maintained is inspected and evaluated for compliance with requirements in accordance with maintenance schedule.   |
|   | 2.5  | Non compliant apparatus/components/samples are documented and arrangements made for their rectification in accordance with established procedures.  |
|   | 2.6  | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.   |
|   | 2.7  | Ongoing checks of the quality of the maintenance are undertaken in accordance with established procedures.  |
|   | 2.8  | Maintenance process compliance is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices. |
| 3 | Complete of maintenance processes and documentation. | 3.1 OHS work completion risk control measures and procedures are followed.  |
|   |  | 3.2 Work site and equipment is cleaned and made safe in accordance with established procedures.   |
|   |  | 3.3 Final checks are made to verify that the maintenance complies with requirements.  |
|   |  | 3.4 Maintenance completion is documented and an appropriate person or persons notified in accordance with established procedures and regulations.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and maintaining microbial control of air and water systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.13.8  | Scheduled maintenance processes           |
| 2.15.23 | Microbial control fundamentals            |
| 2.18.1  | Occupational Health and Safety principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to maintaining microbial control of at least two different air and water systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain microbial control of air and water systems as described in 7) and including:
    - A Interpreting maintenance schedule requirements correctly
    - B Following quality assurance and risk management compliance processes
    - C Following maintenance schedule
    - D Sampling water condition
    - E Inspecting and evaluating apparatus for quality assurance and risk compliance
    - F Arranging for corrective action of non compliant apparatus
    - G Documenting maintenance work.

- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in maintaining microbial control of air and water systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
1 Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 2.4; 2.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEJ069A Plan refrigeration and air conditioning projects

### Unit Descriptor

1)

This unit covers development and documentation of Refrigeration and air conditioning project proposals, milestones and completions. It encompasses, establishing budgets, critical path analysis, development of workflow strategies, documenting, presenting and negotiating budgets and timelines.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit shall be assessed only after the technical units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Refrigeration and Air Conditioning

<b>ELEMENT</b>		<b>PERFORMANCE CRITERIA</b>	
5) Elements describe the essential outcomes of a unit		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Prepare to plan project.	1.1	OHS processes and procedures for a given work area are identified, identified, obtained and understood
		1.2	Established techniques for project planning are reviewed are adopted in accordance with organisation policies.
		1.3	The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).
2	Develop project plan proposal.	2.1	Estimated plant, material, labour and other costs are sought and obtained from appropriate person(s) in accordance with organisation policies and procedures.
		2.2	Project budget is established from estimated plant, material, labour and other costs in accordance with organisation policies and procedures.
		2.3	Knowledge of critical path analysis is applied to developing workflow strategies.
		2.4	Sources and availability of materials and human resources needed for the project are established in accordance with organisation policies and procedures.
		2.5	Risk management strategies are sought and obtained for incorporating in the project plan.
		2.6	Project plan is reviewed against all inputs and adjusted to rectify any anomalies.
		2.7	Project plan proposal is documented in accordance with organisation policies and procedures.
3	Obtain approval for project plan.	3.1	Project plan is presented and discussed with person(s) of higher authority.
		3.2	Alterations to the project plan resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.

- 3.3 Final project plan is documented and approval obtained from appropriate person(s).

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and planning refrigeration and air conditioning projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.16.1 Project Planning
- 2.2.18 Critical path and project analysis
- 2.2.31 Refrigeration and air conditioning industry sector customs and practices
- 2.18.8.2 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to managing an industry accepted medium sized refrigeration or air conditioning project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances,

assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan refrigeration and air conditioning projects as described in 7) and including:
    - A Determining the project requirements accurately,
    - B Establishing a project budget
    - C Developing effective work flow strategies,
    - D Documenting project plan proposal
    - E Negotiating alterations to the proposed project plan successfully
    - F Obtaining approval of the final plan
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in planning refrigeration and air conditioning projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and

incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.6 to 3.2	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 1.6; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.7 to 3.2

## **UEENEEJ070A      Diagnose and rectify faults in refrigeration and air conditioning control systems**

### **Unit Descriptor**

**1)**

This unit covers diagnosing, repairing faults and replacing faulty components in refrigeration and air conditioning control systems, components, interconnecting circuits and equipment operating at voltages up to 1000 V a.c. It encompasses working safely, reading circuit diagrams, system diagrams and manufacturers reference material, sketching diagrams from traced wiring, applying logical fault finding procedures, conducting repairs, replacing components and completing the necessary service documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ003A	Determine the basic operating conditions of refrigeration and air conditioning systems.
UEENEEJ004A	Determine the basic operating conditions of air conditioning systems
UEENEEJ007A	Install refrigeration and air conditioning systems, major components and associated equipment
UEENEEJ053A	Find and rectify faults in appliance motors and associated controls

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      3      Writing      3      Numeracy      3

**Application of the Unit 3)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**Licence to practise 3.1)**

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to find and rectify faults

1.1 OHS procedures for a given work area are identified, identified, obtained and understood

1.2 OHS risk control measures and procedures in preparation for the work are followed.

1.3 The nature of the fault is obtained from documentation and/or from work supervisor to establish the scope of work to be undertaken.

1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.

- 1.5 Sources of materials that may be required for the work are accessed in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety
- 2 Find faults
  - 2.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 2.2 The need to test or measure live and operating system is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
  - 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS and regulatory requirements and procedures
  - 2.4 Fault finding is approached methodically drawing on knowledge of refrigeration and air conditioning control systems using measured and calculated values of system and component parameters.
  - 2.5 Faults beyond the scope of refrigeration and air conditioning system are identified.
  - 2.6 Control system components are dismantled where necessary and parts stored to protect them against loss or damage
  - 2.7 Faulty components are rechecked and their fault status and confirmed.
  - 2.8 Unexpected situations are dealt with safely and with the approval of an authorised person.
  - 2.9 Fault finding activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
- 3 Repair fault
  - 3.1 OHS risk control measures and procedures for carrying out the work are followed.
  - 3.2 Arrangements are made for appropriately competent and authorised person to rectify faults that are beyond the scope of refrigeration and air conditioning work.

	3.3	Equipment is checked as being isolated where necessary in strict accordance OHS requirements and procedures
	3.4	Materials required to rectify faults are sourced and obtained in accordance with established procedures.
	3.5	Repairs are affected efficiently without damage to other components or apparatus and using sustainable energy principles.
	3.6	Effectiveness of the repair is tested in accordance with established procedures.
	3.7	Apparatus is reassembled, finally tested and prepared for return to customer.
4	Completion and report fault finding and rectification activities	4.1 OHS work completion risk control measures and procedures are followed.
		4.2 Work area is cleaned and made safe in accordance with established procedures.
		4.3 Written justification is made for repairs to circuits/apparatus.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in refrigeration and air conditioning control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.1	Enterprise communication methods
2.2.3	Fault finding techniques
2.3.5	Refrigeration system controls
2.3.6	Air conditioning system controls
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical safe working practices
2.18.3.1	Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to diagnose and rectify the following faults in at least two refrigeration and air conditioning control systems.

- Open-circuit
- Short-circuit
- Incorrect connections
- Insulation failure
- Unsafe condition
- Control apparatus/component failure
- Related mechanical failure

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose and rectify faults in refrigeration and air conditioning control systems as described in 7) and including:
    - A Using methodical fault finding techniques,
    - B Finding faults efficiently,

- C Rectifying faults without damage
- D Providing written justification for the rectifications undertaken
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in diagnosing and rectifying faults in refrigeration and air conditioning control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEJ013A Commission refrigeration and air conditioning systems

**Key**

**8.6)**

**competencies**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.6; 2.7	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.6; 3.6; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.4 to 2.7; 3.2 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## UEENEEJ071A Solve problems in refrigerated beverage vending cabinets

### Unit Descriptor

1)

This unit covers solving problems in refrigerated beverage vending cabinets. It encompasses working safely and to standards, applying knowledge of the components and operation of refrigerated beverage vending cabinets, using effective problem solving techniques and documenting solutions.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ011A Diagnose and rectify faults in refrigeration and air conditioning components and systems

UEENEEJ013A Commission refrigeration and air conditioning systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for undertaking refrigeration and air conditioning work and in particular working with refrigerants. Practice in workplace and during training is also subject to regulations directly related to

occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to solve problems in refrigerated beverage vending cabinets

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
- 1.6 Sources of materials that may be required for the work are accessed in accordance with established procedures
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve problems in refrigerated beverage vending cabinets

- 2.1 OHS risk control measures and procedures for carrying out the work are followed

- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Problems are approached methodically drawing on operational knowledge of refrigerated beverage vending cabinets using observation, measurement, calculations and comparison with normal operating values of system and components
- 2.5 Information needed to solve problems is gathered and evaluated against normal operating parameters.  
  - Note:  
 Examples of information needed to solve problems are system specifications, as-installed drawings, maintenance and service records and measured and calculated values of component operating parameters.
- 2.6 Problems are dealt with safely and with the approval of an authorised person
- 2.7 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices
- 3 Complete work and document problem solving activities
  - 3.1 OHS risk control work completion measures and procedures are followed
  - 3.2 Work site is cleaned and made safe in accordance with established procedures
  - 3.3 Justification for solutions used to solve problems is documented
  - 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures

**REQUIRED SKILLS AND KNOWLEDGE**

6) This describes the essential skills and knowledge and their level, required for this unit.  
 Evidence shall show that knowledge has been acquired of safe working practices and solving problems in refrigerated beverage vending cabinets. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.17.37 Beverage vending cabinets

- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in solving at least three operational problems related to refrigerated beverage vending cabinets.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to

its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve problems in refrigerated beverage vending cabinets as described in 7) and including:
    - A Using methodical fault finding techniques,
    - B Assessing relevant information
    - C Solving problems effectively
    - D Providing written justification for the solutions used
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with

the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in solving problems in refrigerated beverage vending cabinets.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEJ009A      Carry out scheduled maintenance

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 4.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.6	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7

## **UEENEEJ072A      Recover, pressure and leak test, evacuate and charge refrigerants — split air conditioning systems**

### **Unit Descriptor**

**1)**

This unit covers the recovery of refrigerants from split air conditioning systems pressure and leak tests, recover and charge refrigerants in split air conditioning systems. It encompasses working safely and to standards, following regulations and industry practices for handling refrigerants and completing the necessary documentation.

Note: The Ozone Protection and Synthetic Greenhouse Gas Legislation Amendment Bill 2003 may apply to this unit. Prior to planning the delivery of any training and/or assessment activities all legislative and regulatory requirements shall be identified and included.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ002A      Prepare refrigerant tubing and fittings

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading      3      Writing      3      Numeracy      3

### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training and may be used to augment other electrotechnology qualifications at AQF 2 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit may, in some States/Territories, require a licence to practise in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. The Ozone Protection and Synthetic Greenhouse Gas Legislation Amendment Bill 2003 may apply to this unit. Prior to planning the delivery of any training and/or assessment activities all legislative and regulatory requirements shall be identified and included.
2. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
3. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1 Prepare to recover refrigerants, pressure and leak test, evacuate and charge split air conditioning systems.

- 1.1 OHS procedures for a given work area are identified, identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
- 1.3 Safety hazards which have not previously been identified are noted and established risk control measures are implemented.
- 1.4 The nature of the problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 The work is appropriately sequenced in accordance with job schedule.
- 1.6 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.

- |   |   |      |   |
|---|---|------|---|
|   |   | 1.7  | Refrigerants, lubricants and cleaning materials needed for the work are obtained in accordance with established procedures and checked against job requirements   |
|   |   | 1.8  | Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety   |
|   |   | 1.9  | Preparatory work is checked to ensure no damage has occurred and complies with requirements.  |
| 2 | Recover refrigerants, pressure and leak test, evacuate and charge split air conditioning systems. | 2.1  | OHS risk control measures and procedures for carrying out the work are followed   |
|   |   | 2.2  | Checks are carried out to ensure the system or component parts are isolated, when necessary, in strict accordance with OHS requirements and procedures  |
|   |   | 2.3  | Machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures and circuits are isolated and confirmed by appropriately competent personnel  |
|   |   | 2.4  | Refrigerants are removed from a split air conditioning system safely into suitably labelled containers in accordance with regulatory requirements and industry practices, and any electrical work is referred to an appropriate licensed person |
|   |   | 2.5  | Precautions are taken to prevent damage to components while pressure testing the system   |
|   |   | 2.6  | Pressure testing is conducted at a pressure compatible with the refrigerant to be used  |
|   |   | 2.7  | Leaks are located and rectified using testing methods appropriate to the system under test and in accordance with industry practices  |
|   |   | 2.8  | Split air conditioning is evacuated to the required level and cleaned the system of all moisture and other containments in accordance with industry practices   |
|   |   | 2.9  | A ‘Drop test’ is used to prove effectiveness of the evacuation in accordance with industry practice   |
|   |   | 2.10 | Components lubricants are checked and maintained in accordance with manufacturer’s requirements   |

- |   |  |      |   |
|---|--|------|---|
|   |  | 2.11 | Split air conditioning is charged with the appropriate refrigerant in accordance with manufacturer requirements and industry practices  |
|   |  | 2.12 | Problematic situations that arise during the work are dealt with in an appropriate manner   |
|   |  | 2.13 | Split air conditioning are pressure and leak tested, evacuated and charged efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices |
| 3 | Complete and report refrigerants recovery, pressure and leak test and evacuate and charge work | 3.1  | OHS risk control work completion measures and procedures are followed   |
|   |  | 3.2  | Work site is cleaned and made safe in accordance with established procedures  |
|   |  | 3.3  | Contaminated refrigerant is dealt with in accordance with legislative/regulatory requirements   |
|   |  | 3.4  | Completion of the work is documented and an appropriate person or persons notified in accordance with established procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and recovering, pressure and leak testing, evacuating and charging refrigerants — split air conditioning systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |          |   |
|--|----------|---|
|  | 2.11.9.1 | Basic refrigeration testing and measuring field devices |
|  | 2.11.9.2 | Fitting and removing refrigeration service gauges       |
|  | 2.15.1   | Refrigeration compressors                               |
|  | 2.15.2   | Condensers  |
|  | 2.15.3   | Evaporators   |
|  | 2.15.4.1 | Refrigerant flow controls and distributors              |
|  | 2.15.9.4 | Split air conditioning systems                          |
|  | 2.17.1.1 | Refrigeration fundamentals                              |
|  | 2.17.1.2 | Basic refrigeration system operating conditions         |

- 2.17.2.2 Split air conditioning refrigerants
- 2.18.1 Occupational Health and Safety principles
- 2.18.3.1 Refrigeration and air conditioning safe working practices

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to testing and charging split air conditioning systems encompassing the following:

- Recovering refrigerant from an existing split air conditioning system
- Pressure and leak testing a newly installed systems
- Evacuating newly systems in preparation for charging with refrigerant
- Charging newly installed systems with refrigerant

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Recover, pressure and leak test, evacuate and charge refrigerants — split air conditioning systems as described in 7) and including:
  - A Selecting appropriate materials and equipment
  - B Removing and storing refrigerant correctly
  - C Conducting pressure testing at the appropriate pressure level and without damaging components
  - D Locating and rectifying leaks
  - E Evacuating the system to the required standard and using appropriate vacuum measuring instruments
  - F Charging the system with the appropriate refrigerant
  - G Completing the necessary documentation
  - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in recovering, pressure and leak testing, evacuating and charging refrigerants — split air conditioning systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.9	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.7; 2.12	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4 to 2.11	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4 to 2.9
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.9
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.12

## UEENEEJ073A Service microwave ovens

### Unit Descriptor

1)

This unit covers maintaining the effective and efficient operation of microwave ovens. It encompasses working safely, applying knowledge of microwave ovens, following service manuals, testing appliance function, locating and rectifying faults and defective components and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEJ054A	Find and rectify faults in appliance control systems
-------------	--

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may also used to augment formally acquired competencies.

### Licence to practise

3.1)

The skills and knowledge described in this unit require a licence to practise in the workplace where appliances are connected to fixed wiring at voltage above 50 V a.c. or 120 V d.c. In some States/Territories a licence is required to practise this unit in the workplace subject to regulations for servicing electrical appliance. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and

typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

**Competency Field 4)**

Refrigeration and Air Conditioning

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

1	Prepare to service microwave ovens.	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	OHS risk control measures and procedures in preparation for the work are followed
		1.3	The extent of work to be undertaken is determined from service/fault request and/or discussions with appropriate person(s)
		1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
		1.5	Sources of materials/parts that may be required for the work are established in accordance with established procedures
		1.6	Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety
2	Service microwave ovens	2.1	OHS risk control measures and procedures for carrying out the work are followed
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
		2.3	Appliance is checked as being correctly isolated where necessary in strict accordance OHS requirements and procedures

- 2.4 Safety hazards resulting from the defect or fault are documented and risk control measures devised and implemented in consultation with appropriate personnel
  - 2.5 Appliances are tested for efficient operation and components affecting efficiency are inspected for wear or defects in accordance with standards, manufacturer service manuals and industry codes of practice
  - 2.6 Appliance faults and their cause are identified through the application of refrigerated appliances and using measured and calculated values of appliance parameters
  - 2.7 Appliance is dismantled where necessary and parts stored to protect them against loss or damage
  - 2.8 Defective, worn or faulty appliance components are rechecked and their status confirmed
  - 2.9 Replacement parts required to rectify defects/faults are sourced and obtained in accordance with established procedures
  - 2.10 Effectiveness of the repair is tested in accordance with established procedures
  - 2.11 Apparatus is reassembled, finally tested and prepared for return to service
  - 2.12 Unexpected situations are dealt with safely and with the approval of an authorised person
  - 2.13 Servicing activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices
- 3 Completion and report fault finding and repair activities.
- 3.1 OHS risk control work completion measures and procedures are followed
  - 3.2 Work site is cleaned and made safe in accordance with established procedures
  - 3.3 Service report is completed and verified by an appropriate person in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

- 6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and servicing microwave ovens. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.6.27.2 Microwave ovens
- 2.18.1 Occupational health and safety principles
- 2.18.13 Appliance servicing safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to servicing microwave ovens with any four of the following defects/faults in electric heating systems in each of two different types of appliance:

- Higher energy use than previously experienced
- Not cold enough.
- Appliance light not working.
- Electric shock received from appliance cabinet.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Service microwave ovens as described in 7) and including:
  - A Determining the nature of the work from service request
  - B Identifying defective components affecting appliance efficiency
  - C Finding faults efficiently
  - D Rectifying defects/faults effectively
  - E Testing appliance functions effectively
  - F Completing service report accurately
  - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Evidence should show demonstrated competency in servicing microwave ovens.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.4; 2.12; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.5 to 2.8	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.11



**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1K  
K – Renewable and Sustainable Energy**

**Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008**

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## **UEENEEK001A Maintain safety and tidiness of remote area power supply (RAPS) systems**

### **Unit Descriptor**

**1)**

This unit covers maintaining safety of RAPS system by ensuring that only RAPS equipment is present and is in its allotted place and that the system is free of litter. It encompasses working safely, regularly checking systems, cleaning techniques and reporting safety issues.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

### **Competency Field**

**4)**

Renewable and Sustainable Energy

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Prepare to maintain safety and tidiness of RAPS system	<p>1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.</p> <p>1.4 The nature and location of the RAPS system is obtained from work schedule and supervisor to establish the scope of work to be undertaken.</p> <p>1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community.</p> <p>1.6 Tools and equipment needed to carry out the cleaning work are obtained and checked for correct operation and safety</p>
2 Maintain safety and tidiness of RAPS system	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.3 Circuits/machines/system are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.4 Routine procedures are used to clean RAPS system and area.</p> <p>2.5 Cleaning is carried out efficiently without waste of materials and energy or damage to apparatus, circuits, the surrounding environment or services.</p> <p>2.6 Routine quality checks are carried out in accordance with work instructions.</p>

3	Complete work and report	3.1	OHS risk control work completion measures and procedures are followed.
		3.2	Procedures for referring cleaning and tidiness issues to the local community are followed.
		3.3	Completion of cleaning work and issues are reported to work supervisor in accordance with established routines.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining safety and tidiness of remote area power supply (RAPS) systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.13.1	RAPS plant area cleaning
2.18.1	Occupational Health and Safety principles
2.18.4	Remote area power supply safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems incorporating a battery bank and at least two of the following:

- Generator set
- Photo voltaic array
- RAP system
- Wind generator

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. Assessment, in part or full, can occur outside the workplace, however, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement OHS workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified

in the Performance Criteria and Range Statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain safety and tidiness of remote area power supply (RAPS) systems as described in 7) and including:
    - A Removing non-RAPS equipment
    - B Safely removing insects, spiders and any animals
    - C Safely removing dust and dirt from floors and equipment
    - D Identifying and reporting at least two safety issues
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining safety and tidiness of remote area power supply (RAPS) systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with units UEENEEE001A Apply OHS practices in the workplace.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 3.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4; 2.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.6	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: 2.6

## **UEENEEK002A Work safely with remote area power supply (RAPS) systems**

### **Unit Descriptor**

**1)**

This unit covers safety practices for working on RAPS systems. It encompasses identifying safety hazards, using risks control measures and following routine procedures for prescribed system maintenance.

Note:

Components of this unit are included in the critical aspects of evidence in each applicable unit to ensure that OHS practices are demonstrated as they apply to RAPS system servicing work functions and situations

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships

### **Competency Field**

**4)**

Renewable and Sustainable Energy

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Prepare to enter a RAPS system	<p>1.1 Instruction in hazards and risk control measures for RAPS systems maintenance are identified, obtained and understood.</p> <p>1.2 System access permit is obtained from work supervisor.</p> <p>1.3 Preparations for electrical and non-electrical isolation are made to prevent creation of hazards</p> <p>1.4 Tools and equipment needed for the work are checked for safety and correct functionality according to established safety routines.</p>
2 Apply safe working practices in RAPS system area.	<p>2.1 Workplace procedures and work instructions for controlling risk are followed accurately.</p> <p>2.2 Workplace procedures for dealing safe working practices in RAPS system are followed according to prescribed work procedures.</p> <p>2.3 Circuits/machines/system are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.4 Routine procedures are used to apply safe working practices in RAPS system and area.</p> <p>2.5 Safe working practices are carried out efficiently without waste of materials and energy or damage to apparatus, circuits, the surrounding environment or services.</p> <p>2.6 Routine quality checks are carried out in accordance with work instructions.</p>
3. Follow workplace procedures for hazard identification and risk control in RAPS system areas	<p>3.1 Hazards are identified and prescribed control measures implemented and monitored through active participation in the consultation process with employer, other employees and local community.</p> <p>3.2 Hazards in the work are recognised and reported to work supervisor personnel according to established procedures.</p>

- 3.3 OHS records of incidents are completed in accordance with regulatory requirements and established procedures
- 3.4 Workplace instructions and training are followed accurately within established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and working safely with remote area power supply (RAPS) systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.1 Occupational Health and Safety principles
- 2.18.4 Remote area power supply safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems incorporating a battery bank, a generator set and a photo voltaic array and at least one similar RAPS system with the additions of a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances,

assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Work safely with remote area power supply (RAPS) systems as described in 7) and including:
    - A Preparing to enter the RAPS system including, permission to enter the area and to isolate RAPS equipment
    - B Applying work procedures and instructions as they apply to risk control measures
    - C Dealing with accidents and emergencies
    - D Participating in consultation processes, identifying hazards and implementing and monitoring control measures
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in working safely with remote area power supply (RAPS) systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competence development in this unit may be arranged concurrently with other units in a qualification or possible skill clusters in which this unit is included.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) must be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:	
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 3.1	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.4	1
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**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEK003A    Conduct periodic maintenance of remote area power supply (RAPS) battery banks**

### **Unit Descriptor**

**1)**

This unit covers maintenance of remote area power supply battery banks where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of battery faults using routine procedures and completing the necessary maintenance reporting.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE001A    Apply OHS practices in the workplace

UEENEEE002A    Dismantle, assemble and fabricate electrotechnology components

UEENEEE003A    Solve problems in extra-low voltage single path circuits

UEENEEK001A    Maintain safety and tidiness of remote area power supply plant area

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

**License to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to conduct periodic maintenance of battery banks

- 1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
- 1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Maintain RAPS systems battery banks.

2.1 Established OHS risk control measures and procedures for carrying out the work are followed

- |   |  |   |  |
|---|--|---|--|
|   | 2.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures                     |  |
|   | 2.3  | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures  |  |
|   | 2.4  | Prescribed maintenance procedures are used to test and check RAPS system battery banks  |  |
|   | 2.5  | Battery bank maintenance, including performance measurements and repairs are carried out safely and to prescribed routines and procedures                                       |  |
|   | 2.6  | Known types of battery functional faults are identified using routine fault finding procedures  |  |
|   | 2.7  | Procedures are followed for referring non-routine events to immediate supervisor for directions   |  |
|   | 2.8  | Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services |  |
|   | 2.9  | Routine quality checks are carried out in accordance with work instructions   |  |
| 3 | Complete maintenance work on battery banks and report. | 3.1   | OHS work completion risk control measures and procedures are followed  |
|   |  | 3.2   | Work site is cleaned and made safe in accordance with routine procedures   |
|   |  | 3.3   | Procedures for referring local maintenance issues to the community are followed  |
|   |  | 3.4   | Battery bank performance measurements are reported to the work supervisor through the established maintenance reporting procedures |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) battery banks. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |  |
|--------|--|
| 2.13.2 | RAPS systems battery bank maintenance techniques |
|--------|--|

- 2.18.1 Occupational Health and Safety principles
- 2.18.4 Remote area power supply safe working practice

## **RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the battery bank is charged from a generator set and a photo voltaic array and at least one similar RAPS system where the battery bank is charged from a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## **EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### **Overview of Assessment**

#### **8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will

contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct periodic maintenance of remote area power supply (RAPS) battery banks as described in 7) and including:
    - A Measuring and recording specific gravity of electrolyte
    - B Measuring and recording cell voltages
    - C Visual inspecting of batteries for low electrolyte levels; electrolyte leakage corroded terminals and connections
    - D Topping up low electrolyte levels

- E Identifying electrolyte leaks
- F Cleaning corroded terminals and connections and treating with an anticorrosive
- G Reporting all maintenance activities
- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting periodic maintenance of remote area power supply (RAPS) battery banks.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK004A                      Conduct periodic maintenance of remote area power supply generator sets

UEENEEK005A Conduct periodic maintenance of remote area power supply photo voltaic arrays

UEENEEK007A Conduct periodic maintenance of remote area power supply wind generators

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) must be reassured in relation to this unit..

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.7; 2.5	1
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**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  2.4 to 2.8
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEEK004A    Conduct periodic maintenance of remote area power supply (RAPS) generator sets**

### **Unit Descriptor**

**1)**

This unit covers maintenance of remote area power supply generator sets where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of generator faults using routine procedures and completing the necessary maintenance reporting

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE001A	Apply OHS practices in the workplace
UEENEEE002A	Dismantle, assemble and fabricate electrotechnology components
UEENEEE003A	Solve problems in extra-low voltage single path circuits
UEENEEK001A	Maintain safety and tidiness of remote area power supply plant area

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

**Competency Field**

**4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to conduct periodic maintenance on generator sets

- 1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
- 1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Maintain RAPS systems generator sets

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

- |   |  |   |
|---|--|---|
|   | 2.3  | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures  |
|   | 2.4  | Prescribed maintenance procedures are used to test and check RAPS system generator sets   |
|   | 2.5  | Generator set maintenance, including performance measurements and repairs, are carried out safely and to prescribed routines and procedures                                     |
|   | 2.6  | Known types of generator set functional faults are identified using routine fault finding procedures  |
|   | 2.7  | Procedures are followed for referring non-routine events to immediate supervisor for directions   |
|   | 2.8  | Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services |
|   | 2.9  | Routine quality checks are carried out in accordance with work instructions.  |
| 3 | Complete maintenance work of generator sets and report | 3.1 OHS work completion risk control measures and procedures are followed   |
|   |  | 3.2 Work site is cleaned and made safe in accordance with routine procedures  |
|   |  | 3.3 Procedures for referring local maintenance issues to the community are followed   |
|   |  | 3.4 Generator set performance measurements are reported to the work supervisor through the established maintenance reporting procedures   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) generator sets. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |  |
|--------|--|
| 2.13.3 | RAPS system generator sets maintenance techniques      |
| 2.18.1 | Occupational Health and Safety principles              |
| 2.18.4 | Remote Area Powers Supply system safe working practice |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the generator set is charged from a generator set and a photo voltaic array and at least one similar RAPS system where the generator set is charged form a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct periodic maintenance of remote area power supply (RAPS) generator sets as described in 7) and including:
    - A Measuring and recording generator no-load and load voltages
    - B Measuring and recording generator out put for three load conditions
    - C Checking drive engine coolant and oil level
    - D Visually inspecting drive engine for coolant and oil leaks
    - E Checking condition of drive engine oil, oil filter and air filter

- F Identifying need to change drive engine oil, oil filter and air filter
- G Changing drive engine oil, oil filter and air filter
- H Topping up low coolant and oil levels
- I Identifying the cause of any coolant and oil leaks
- J Reporting all maintenance activities
- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting periodic maintenance of remote area power supply (RAPS) generator sets.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEK003A            Conduct periodic maintenance of remote area power supply battery banks
- UEENEEK005A            Conduct periodic maintenance of remote area power supply photo voltaic arrays
- UEENEEK007A            Conduct periodic maintenance of remote area power supply wind generators

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) must be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas	Refer to the following Performance Criteria for examples of application:	

and techniques used?	N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.7; 2.5	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-	Refer to the following Performance Criteria for examples of application:

	routine or contingent situations	2.6
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## **UEENEEK005A    Conduct periodic maintenance of remote area power supply (RAPS) photo voltaic arrays**

### **Unit Descriptor**

1)

This unit covers maintenance of remote area power supply photo voltaic arrays where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of photo voltaic array faults using routine procedures and completing the necessary maintenance reporting.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE001A      Apply OHS practices in the workplace

UEENEEE002A      Dismantle, assemble and fabricate electrotechnology components

UEENEEE003A      Solve problems in extra-low voltage single path circuits

UEENEEK001A      Maintain safety and tidiness of remote area power supply plant area

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      3      Writing      3      Numeracy      3

### **Application of the Unit**

3)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

### **License to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to conduct periodic maintenance on photo voltaic arrays

- 1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures.
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.
- 1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community.
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Maintain RAPS systems photo voltaic arrays

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Prescribed maintenance procedures are used to test and check RAPS system photo voltaic arrays.
- 2.5 Photo voltaic array maintenance, including performance measurements and repairs are carried out safely and to prescribed routines and procedures.
- 2.6 Known types of photo voltaic array functional faults are identified using routine fault finding procedures.
- 2.7 Procedures are followed for referring non-routine events to immediate supervisor for directions.
- 2.8 Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
- 2.9 Routine quality checks are carried out in accordance with work instructions.
- 3 Complete maintenance work of photo voltaic arrays and report
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with routine procedures.
  - 3.3 Procedures for referring local maintenance issues to the community are followed.
  - 3.4 Photo voltaic array performance measurements are reported to the work supervisor through the established maintenance reporting procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) photo voltaic arrays sets. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.13.4 RAPS systems photovoltaic array maintenance techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.4 Remote Area Power Supply safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the photo voltaic array is charged from a photo voltaic array and a photo voltaic array and at least one similar RAPS system where the photo voltaic array is charged from a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to

consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies & workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct periodic maintenance of remote area power supply (RAPS) photo voltaic arrays as described in 7) and including:
    - A Measuring and recording array no-load and load voltages together with ambient temperature
    - B Measuring and recording array output for three load conditions
    - C Visually inspecting array modules and support structure for physical damage
    - D Visually inspecting array connections and cables
    - E Identifying array defects and faults

- F Reporting all maintenance activities
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting periodic maintenance of remote area power supply (RAPS) photo voltaic arrays.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK003A	Conduct periodic maintenance of remote area power supply battery banks
UEENEEK004A	Conduct periodic maintenance of remote area power supply generator sets
UEENEEK006A	Conduct periodic maintenance of remote area power supply wind generators

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) must be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.7; 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an

explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEK006A    Conduct periodic maintenance of remote area power supply (RAPS) wind generators**

### **Unit Descriptor**

**1)**

This unit covers maintenance of remote area power supply wind generators where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of wind generator faults using routine procedures and completing the necessary maintenance reporting.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE001A      Apply OHS practices in the workplace

UEENEEE002A      Dismantle, assemble and fabricate electrotechnology components

UEENEEE003A      Solve problems in extra-low voltage single path circuits

UEENEEK001A      Maintain safety and tidiness of remote area power supply plant area

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      3      Writing      3      Numeracy      3

### **Application of the Unit**

**3)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to conduct periodic maintenance on wind generators

- 1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.
- 1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community.
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Maintain RAPS systems wind generators

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Prescribed maintenance procedures are used to test and check RAPS system wind generators
- 2.5 Wind generator maintenance, including performance measurements and repairs, are carried out safely and to prescribed routines and procedures.
- 2.6 Known types of wind generator functional faults are identified using routine fault finding procedures.
- 2.7 Procedures are followed for referring non-routine events to immediate supervisor for directions.
- 2.8 Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
- 2.9 Routine quality checks are carried out in accordance with work instructions.
- 3 Complete maintenance work of wind generators and report
  - 3.1 OHS work completion risk control measures and procedures are followed.
  - 3.2 Work site is cleaned and made safe in accordance with routine procedures.
  - 3.3 Procedures for referring local maintenance issues to the community are followed.
  - 3.4 Wind generator performance measurements are reported to the work supervisor through the established maintenance reporting procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) wind generators. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.13.5 RAPS systems wind generator maintenance techniques
- 2.18.1 Occupational Health and Safety principles
- 2.18.4 Remote Area Power Supply safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the wind generator is charged from a wind generator and a wind generator and at least one similar RAPS system where the wind generator is charged form a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct periodic maintenance of remote area power supply (RAPS) wind generators as described in 7) and including:
    - A Measuring and recording generator no-load and load voltages;
    - B Measuring and recording generator output for three load conditions;
    - C Visually inspecting generator and support structure for physical damage;
    - D Visually inspecting generator connections and cables;
    - E Identifying generator defects and faults;
    - F Reporting all maintenance activities

- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting periodic maintenance of remote area power supply (RAPS) wind generators.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK003A	Conduct periodic maintenance of remote area power supply battery banks
UEENEEK004A	Conduct periodic maintenance of remote area power supply generator sets
UEENEEK005A	Conduct periodic maintenance of remote area power supply photo voltaic arrays

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) must be reassured in relation to this unit.

**Key**

**8.6)**

**competencies**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.7; 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEK007A      Conduct checks in the demand side use of remote area power supplies**

### **Unit Descriptor**

**1)**

This unit covers checking the community use of a remote area power supply. This encompasses working safely, taking system readings, replacing the data-logging chip, identifying known types of systems faults caused by inappropriate use of electrical apparatus supplied from a remote area power supply system and completing the necessary check report.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE001A      Apply OHS practices in the workplace

UEENEEK002A      Work safely in remote area power supply plant areas

UEENEEK003A      Conduct periodic check of remote area power supply battery banks

UEENEEK004A      Conduct periodic check of remote area power supply generator sets

UEENEEK005A      Conduct periodic check of remote area power supply photo voltaic array

UEENEEK006A      Conduct periodic check of remote area power supply

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      3      Writing      3      Numeracy      3

**Application of the Unit 3)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

**License to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to check RAPS system use

- 1.1 OHS procedures for a RAPS system are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.
- 1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community.
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures.

- |   |   |   |  |
|---|---|---|--|
|   | 1.7   | Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety |  |
| 2 | Check use of RAPS system                      | 2.1   | Established OHS risk control measures and procedures for carrying out the work are followed.   |
|   |   | 2.2   | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures  |
|   |   | 2.3   | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures                                   |
|   |   | 2.4   | Prescribed check procedures are used to test and check RAPS systems  |
|   |   | 2.5   | Retrieval of performance data is carried out safely and to prescribed routines and procedures.   |
|   |   | 2.6   | Known types of functional faults are identified using routine fault finding procedures.  |
|   |   | 2.7   | Procedures are followed for referring non-routine events to immediate supervisor for directions.   |
|   |   | 2.8   | Checking is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services |
|   |   | 2.9   | Routine quality checks are carried out in accordance with work instructions.   |
| 3 | Complete check of wind RAPS system and report | 3.1   | OHS work completion risk control measures and procedures are followed.   |
|   |   | 3.2   | Work site is cleaned and made safe in accordance with routine procedures.  |
|   |   | 3.3   | Procedures for referring local check issues to the community are followed.   |
|   |   | 3.4   | Check results are reported to the work supervisor through the established check reporting procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting checks in the demand side use of remote area power supplies. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.13.7	RAPS systems maintenance scheduling
2.18.1	Occupational Health and Safety principles
2.18.4	Remote Area Power Supply safe working practice

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the wind generator is charged from a wind generator and a wind generator and at least one similar RAPS system where the wind generator is charged form a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Conduct checks in the demand side use of remote area power supplies as described in 7) and including:
  - A Retrieving of performance data
  - B Identifying demand use issues
  - C Reporting all check activities

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting checks in the demand side use of remote area power supplies.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK003A	Conduct periodic maintenance of remote area power supply battery banks
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**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.7; 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEK008A Plan periodic maintenance schedules of remote area power supplies**

### **Unit Descriptor**

1)

This unit covers plant maintenance planning and scheduling. It encompasses developing and self managing simple maintenance programs, replacing some specified components and reporting of maintenance work.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEE NEEE001A Apply OHS practices in the workplace

UEE NEEE033A Document occupational hazards and risks in electrical

UEE NEEK002A Work safely in remote area power supply plant areas

UEE NEEK003A Conduct periodic maintenance of remote area power supplies

UEE NEEK004A Plan periodic maintenance schedules for remote area power supplies

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training and may be used to augment other electrotechnology qualifications at AQF 3 level or higher. Additionally, this unit may apply to indigenous persons entering work in remote area power supply (RAPS) servicing. The unit may also apply to renewable energy service work in general and be used in school-based vocational programs.

**License to practise 3.1)**

The skills and knowledge described in this unit may, in some States/Territories, require a licence to practise in the workplace subject to regulations for undertaking plant maintenance planning and scheduling related to RAPS work. Practice in workplace and during training may also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Establish maintenance requirements

- 1.1 OHS policies and procedures, skills required and frequency and level of maintenance work are determined in accordance with maintenance routines
- 1.2 Records are established to manage maintenance work and up-to-date accordance with routine procedures
- 1.3 Level of replacement or repair to be done under maintenance work is established in accordance with manufacturer and community requirements
- 1.4 Needed maintenance program, including basic periodic instruction in demand side use, is established in accordance with local community requirements

2 Develop and implement maintenance schedule

- 2.1 Maintenance schedules are developed from recommendations of equipment manufacturers and in accordance with RAPS system safety and performance requirements

	2.2	Procedures are developed and implemented to ensure the maintenance program is followed in accordance with the planned schedule and requirements
	2.3	Procedures are developed and implemented to ensure records are maintained in accordance with planned schedule and requirements
3	Evaluate maintenance program	3.1 Periodic and sample inspection reports are used to ascertain maintenance quality and the need for revision of maintenance schedule and frequency
		3.2 Maintenance schedule is periodically reviewed and revised to maintain the integrity of the RAPS system

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of plant maintenance planning and scheduling, encompassing the development and self management of simple maintenance programs, replacing some specified components and reporting of maintenance work. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.13.1 RAPS plant area cleaning
- 2.13.2 RAPS system battery bank maintenance techniques
- 2.13.4 RAPS systems photovoltaic array maintenance techniques
- 2.13.7 RAPS system maintenance schedule
- 2.13.8 Scheduled maintenance processes
- 2.18.1 Occupational Health and Safety principles
- 2.20.3 Introduction to renewable energy technologies
- 2.20.5 Remote area essential services facilities

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in plant maintenance planning and scheduling including developing and self managing simple maintenance programs, replacing some specified components and reporting of maintenance work according to established procedures and requirements.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop a plan for periodic maintenance of RAPS systems located in different communities as listed in 7) . It must incorporate the following components:
    - A Safety requirements
    - B Items to be check and tested
    - C Items to be replaced or repaired
    - D Frequency of the periodic maintenance
    - E Materials and equipment required
    - F Time needed to conduct maintenance on each RAPS system
    - G Travel distance and times to each community
    - H Protocols for working in different communities,
    - I Methods for recording and evaluating maintenance,
    - J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Access to a supervisor for obtaining work instructions and advice.
- Maintenance and repair materials
- Maintenance requirements for RAPS system incorporating Battery bank; Engine driven generator sets; Fuel storage; Inverter and regulator; Photo voltaic array, and Wind generators.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing a plan for periodic maintenance of RAPS systems located in different communities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- |              |  |
|--------------|--|
| UEE NEEK003A | Conduct periodic maintenance of remote area power supply battery banks   |
| UEE NEEK004A | Conduct periodic maintenance of remote area power supply generator sets  |
| UEE NEEK006A | Conduct periodic maintenance of remote area power supply wind generators |

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 2.3 to 2.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an

explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEK009A Attend to breakdowns in remote area power supplies**

### **Unit Descriptor**

**1)**

This unit covers attending to a breakdown of remote area power supplies. It encompasses working safely, ascertaining the nature of a breakdown, the extent of repairs required and the personnel needed to repair the breakdown, and reporting so arrangements can be made for the repair work to be carried out. It also encompasses undertaking specified minor repairs.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE001A Apply OHS practices in the workplace

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE003A Solve problems in extra-low voltage single path circuits

UEENEEK001A Maintain safety and tidiness of remote area power supply plant area

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit must apply to indigenous persons entering work in remote area power supply (RAPS) servicing. The unit may also apply to renewable energy service work in general and be used in school-based vocational programs.

**License to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However they are subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to undertake maintenance work

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
- 1.4 The nature of maintenance work is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Carry out maintenance work

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

- |   |                          |  |
|---|--------------------------|--|
|   | 2.3                      | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures |
|   | 2.4                      | Procedures are followed for referring non-routine events to immediate supervisor for directions                            |
|   | 2.5                      | Work is done efficiently without waste of materials and energy   |
|   | 2.7                      | Work is done without damage to apparatus, circuits, the surrounding environment or services                                |
|   | 2.8                      | Routine quality checks are carried out in accordance with work instructions.   |
| 3 | Complete work and report |  |
|   | 3.1                      | OHS risk control work completion measures and procedures are followed  |
|   | 3.2                      | Work site is cleaned and made safe in accordance with established procedures   |
|   | 3.3                      | Work supervisor is notified of the completion of maintenance in accordance with established procedures and documented      |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and attending to breakdowns in remote area power supplies. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |  |        |  |
|--|--------|--|
|  | 2.13.1 | RAPS plant area cleaning                               |
|  | 2.13.2 | RAPS system battery bank maintenance techniques        |
|  | 2.13.4 | RAPS systems photovoltaic array maintenance techniques |
|  | 2.18.1 | Occupational Health and Safety principles              |
|  | 2.20.3 | Introduction to renewable energy technologies          |
|  | 2.20.5 | Remote area essential services facilities              |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit may be demonstrated in relation to attending to breakdowns in remote area power supplies.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Attend to breakdowns in remote area power supplies as described in 7) and including:
    - A Working safely
    - B Ascertaining the nature of a breakdown
    - C Ascertaining the extent of repairs required and the personnel needed to repair the breakdown
    - D Reporting so arrangements can be made for the repair work to be carried out
    - E Undertaking specified minor repairs
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in attending to breakdowns in remote area power supplies.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK003A	Conduct periodic maintenance of remote area power supply battery banks
UEENEEK004A	Conduct periodic maintenance of remote area power supply generator sets
UEENEEK006A	Conduct periodic maintenance of remote area power supply wind generators

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.7; 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEK010A Coordinate maintenance of renewable energy apparatus and systems**

### **Unit Descriptor**

**1)**

This unit covers coordinating the maintenance of renewable energy apparatus and systems. It encompasses working safely, following maintenance schedules, ascertaining the extent of any repairs required, and the personnel needed to repair the breakdown, providing technical support to maintenance personnel and reporting.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE001A Apply OHS practices in the workplace

UEENEEE002A Dismantle, assemble and fabricate electrotechnology components

UEENEEE003A Solve problems in extra-low voltage single path circuits

UEENEEK001A Maintain safety and tidiness of remote area power supply plant area

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

**License to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to coordinate maintenance

- 1.1 OHS procedures for a given work area are obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work
- 1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel
- 1.4 The extent of work is determined from job specifications, drawings and regulatory requirements
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
- 1.6 Competencies needed to undertake work are determined from job specifications and/or consultation with appropriate personnel
- 1.7 Personnel and materials needed to undertake maintenance are obtained in accordance with established procedures and checked against job requirements
- 1.8 Tools, equipment and testing devices needed to undertake maintenance are obtained in accordance with established procedures and checked for correct operation and safety

- 1.9 Preparatory work is checked to ensure no damage has occurred and complies with requirements
- 2 Carry out maintenance
  - 2.1 OHS risk control measures and procedures for carrying out the work are followed
  - 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
  - 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
  - 2.4 Maintenance is carried out in compliance with technical standards and job specifications and requirements
  - 2.5 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
  - 2.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
  - 2.7 Ongoing checks of the quality of maintenance are undertaken in accordance with job specification, technical standards and/or regulatory requirements
  - 2.8 Work efficiently without waste of materials and energy or damage to apparatus, circuits, the surrounding environment or other services
- 3 Complete work
  - 3.1 OHS risk control work completion measures and procedures are followed
  - 3.2 Work site is made safe in accordance with established safety procedures
  - 3.3 Verify maintenance conforms to requirements
  - 3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and co-ordinating maintenance of renewable energy apparatus and systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.13.1	RAPS plant area cleaning
2.13.2	RAPS system battery bank maintenance techniques
2.13.4	RAPS systems photovoltaic array maintenance techniques
2.18.1	Occupational Health and Safety principles
2.20.3	Introduction to renewable energy technologies
2.20.5	Remote area essential services facilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit may be demonstrated in relation to co-ordinating maintenance of renewable energy apparatus and systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Co-ordinate maintenance of renewable energy apparatus and systems as described in 7) and including:
    - A Interpreting maintenance schedule requirements correctly
    - B Accessing appropriate plant, materials and personnel
    - C Following maintenance schedule
    - D Evaluating apparatus for compliance with specified requirements
    - E Arranging for corrective action of non compliant apparatus
    - F Documenting maintenance work.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in co-ordinating maintenance of renewable energy apparatus and systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and

incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- UEENEEK003A Conduct periodic maintenance of remote area power supply battery banks
- UEENEEK004A Conduct periodic maintenance of remote area power supply generator sets
- UEENEEK006A Conduct periodic maintenance of remote area power supply wind generators

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  1.7; 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## **UEENEEK011A Assemble and connect remote area power supplies (RAPS)**

### **Unit Descriptor**

**1)**

This unit covers installation of remote area power supply systems where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to installation standards, matching equipment with that specified for a given location, placing and securing equipment accurately, making required circuit connections and completing the necessary installation documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE002A	Dismantle, assemble and fabricate electrotechnology components
UEENEEE003A	Solve problems in extra-low voltage single path circuits
UEENEEE007A	Use drawings, diagrams, schedules and service manuals

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

**License to practise 3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to install remote area power supplies

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Health and safety risks are identified, and established risk control measures and procedures are followed in preparation for the work
- 1.3 Safety hazards that have not previously been identified are noted, and established risk control measures are implemented
- 1.4 Installation of apparatus is prepared in consultation with others effected by the work and sequenced appropriately
- 1.5 The nature and location of the work is determined from documentation or appropriate persons to establish the scope of work to be undertaken
- 1.6 Locations of apparatus and associated equipment is planned within the constraints of the building structure, significants and regulations
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others

Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements

Tools, equipment and testing devices needed for the installation work are obtained in accordance with established procedures and checked for correct operation and safety

Preparatory work is checked to ensure no damage has occurred and that it complies with requirements

2 Install remote area power supplies

- 2.1 OHS risk control measures and procedures for carrying out the work are followed
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Apparatus and associated equipment are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance
- 2.5 Wiring is terminated at apparatus and associated equipment in accordance with manufacturer specifications and functional and regulatory requirements
- 2.6 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented
- 2.7 Unexpected situations are dealt with safely and with the approval of an authorised person.
- 2.8 Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures
- 2.9 Apparatus installation is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles

3	Complete maintenance work on battery banks and report	3.1	OHS work completion risk control measures and procedures are followed
		3.2	Work site is cleaned and made safe in accordance with established procedures
		3.3	Final checks are made so that the installed apparatus conforms to requirements
		3.4	‘As-installed’ apparatus and associated equipment is documented and appropriate person(s) notified in accordance with established procedures

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and assembling and connecting remote area power supplies (RAPS). The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.13.2	RAPS Systems battery bank maintenance techniques
2.18.1	Occupational Health and Safety principles
2.20.3	Introduction to renewable energy technologies
2.20.5	Remote area essential services facilities
2.20.6	Remote area essential services power plant

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the battery bank is charged from a generator set and a photo voltaic array and at least one similar RAPS system where the battery bank is charged form a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble and connect remote area power supplies (RAPS) as described in 7) and including:
    - A Reading and interpreting drawings related to and apparatus locations and circuit connections.
    - B Placing and securing apparatus accurately
    - C Maintaining fire integrity
    - D Connecting apparatus and associated equipment to comply with requirements
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling and connecting remote area power supplies (RAPS).

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- |             |   |
|-------------|---|
| UEENEEK004A | Conduct periodic maintenance of remote area power supply generator sets       |
| UEENEEK005A | Conduct periodic maintenance of remote area power supply photo voltaic arrays |
| UEENEEK007A | Conduct periodic maintenance of remote area power supply wind generators      |

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.7; 2.5	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment	Example of Application
1 Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	2.4 to 2.8
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## **UEENEEK012A Provide basic sustainable energy solutions for energy reduction in domestic premises**

### **Unit Descriptor**

**1)**

This unit covers monitoring energy use and providing basic sustainable energy options to reduce the energy consumption in domestic residences. It encompasses working safely and providing basic sustainable energy solutions for energy reduction in domestic premises.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

There are no prerequisite units for this unit.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

**3)**

This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

### **Competency Field**

**4)**

Renewable and Sustainable Energy

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Prepare to monitor energy usage and provide basic solutions for energy reduction	<p>1.1 Monitoring activities are planned and prepared for to ensure OHS policies and procedures are followed with the work appropriately sequenced in accordance with requirements</p> <p>1.2 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved</p> <p>1.3 Materials are obtained and checked in accordance with established procedures and to comply with requirements</p> <p>1.4 Location in which monitoring activities are to be undertaken is determined from job requirements</p> <p>1.5 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements</p> <p>1.6 Materials needed to carry out the monitoring are obtained in accordance with established procedures</p>
2 Undertake monitoring of energy usage and provide basic solutions for energy reduction	<p>2.1 OHS policies and procedures for undertaking monitoring activities are followed</p> <p>2.2 Monitoring activities are undertaken in accordance with requirements, without damage or distortion to the surrounding environment or services</p> <p>2.3 Unplanned events or conditions are responded to in accordance with established procedures</p> <p>2.4 Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are implemented</p> <p>2.5 Ongoing checks of the quality of the work are carried out in accordance with established procedures</p>
3 Complete monitoring activities and provide reports where necessary	3.1 Documentation/reports are completed to ensure administrative requirements are met

- 3.2 Work completion is notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and providing basic sustainable energy solutions for energy reduction in domestic premises. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.8.1.2 Fundamental electrical principles
- 2.8.2.1 Direct current circuits principles
- 2.18.1 Occupational Health and Safety principles
- 2.20.3 Introduction to renewable energy technologies

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to the provision of basic sustainable energy solutions for energy reduction in domestic premises in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

**demonstrate  
competency in  
this unit**

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Provide basic sustainable energy solutions for energy reduction in domestic premises as described in 7) and including:
    - A Providing basic sustainable energy solutions for energy reduction in domestic premises
    - B Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified

**Context of and  
specific  
resources for  
assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in providing basic sustainable energy solutions for energy reduction in domestic premises.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.3; 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.3; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 3.1 to 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## UEENEEK013A Apply sustainable energy practice in daily activities

### Unit Descriptor

1)

This unit covers applying sustainable energy practices in daily activities both at and outside the workplace. It encompasses applying sustainable energy practice in daily activities.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite units for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

### Competency Field

4)

Renewable and Sustainable Energy

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Plan and prepare to apply sustainable energy practice	<p>1.1 Activities are planned and prepared for to ensure OHS policies and procedures are followed with the work appropriately sequenced in accordance with requirements</p> <p>1.2 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved</p> <p>1.3 Materials are obtained and checked in accordance with established procedures and to comply with requirements</p> <p>1.4 Location in which activities are to be undertaken is determined from requirements</p> <p>1.5 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements</p>
2 Apply sustainable energy practice	<p>2.1 OHS policies and procedures for undertaking administrative functions are followed</p> <p>2.2 Activities are undertaken in accordance with requirements, without damage or distortion to the surrounding environment or services</p> <p>2.3 Unplanned events or conditions are responded to in accordance with established procedures</p> <p>2.4 Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are implemented</p> <p>2.5 Ongoing checks of the quality of the work are undertaken in accordance with established procedures</p>
3 Complete the application of sustainable energy	<p>3.1 Documentation/reports are completed to ensure detailed promotional activities requirements are met</p> <p>3.2 Completion is notified in accordance with established procedures</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and applying sustainable energy practices in daily activities. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.18.1	Occupational Health and Safety principles
2.20.3	Introduction to renewable energy technologies
2.20.4	Greenhouse reduction strategies

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to applying sustainable energy practice in daily activities in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Apply sustainable energy practice in daily activities as described in 7) and including:
    - A Applying sustainable energy practice in daily activities
    - B Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified

**Context of and specific resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

**assessment**

This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in applying sustainable energy practices in daily activities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 2.4; 3.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.2; 2.4; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.5
4	Interacting and understanding of	Refer to the following Performance Criteria for examples of application:

	the context of the work task	1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## UEENEEK014A Promote sustainable energy practice in the community

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the promotion of recognised, safe, sustainable energy practices to others in the community.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>There are no prerequisite units for this unit.</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Reading</td> <td style="width: 5%;">3</td> <td style="width: 25%;">Writing</td> <td style="width: 5%;">3</td> <td style="width: 25%;">Numeracy</td> <td style="width: 5%;">3</td> </tr> </table>	Reading	3	Writing	3	Numeracy	3
Reading	3	Writing	3	Numeracy	3		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.</p>						
<b>License to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.</p> <p>Note:</p> <ol style="list-style-type: none"> <li>1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.</li> <li>2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc</li> </ol>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Renewable and Sustainable Energy</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Plan and prepare to promote sustainable energy practice	<p>1.1 Activities are planned and prepared to ensure OHS policies and procedures are followed with the work appropriately sequenced in accordance with requirements</p> <p>1.2 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved</p> <p>1.3 Materials are obtained and checked in accordance with established procedures and to comply with requirements</p> <p>1.4 Location in which activities are to be undertaken is determined from requirements</p> <p>1.5 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements</p>
2 Promote sustainable energy practice	<p>2.1 OHS policies and procedures for undertaking administrative functions are followed</p> <p>2.2 Activities are undertaken in accordance with requirements without damage or distortion to the surrounding environment or services</p> <p>2.3 Unplanned events or conditions are responded to in accordance with established procedures</p> <p>2.4 Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are implemented</p> <p>2.5 Ongoing checks of the quality of the work are undertaken in accordance with established procedures</p>
3 Complete the promotion of sustainable energy	<p>3.1 Documentation/reports are completed to ensure detailed promotional activities requirements are met</p> <p>3.2 Completion is notified in accordance with established procedure</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and promoting sustainable energy practices in the community. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.18.1	Occupational Health and Safety principles
2.20.3	Introduction to renewable energy technologies
2.20.4	Greenhouse reduction strategies

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to promoting sustainable energy practice in the community in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Promote sustainable energy practices in the community as described in 7) and including:
    - A Applying sustainable energy practice in the community
    - B Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in promoting sustainable energy practices in the community.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.2; 2.4	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.1 to 1.6	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.2; 2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	3.1; 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.3

## **UEENEEK017A Maintain and repair facilities associated with remote area essential service operations**

### **Unit Descriptor**

1)

This unit covers basic maintenance of remote area infrastructure facilities. It encompasses working safely, to maintenance standards and following maintenance routines, identifying deterioration and damage to facilities using routine procedures, and completing the necessary maintenance reporting.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE001A      Apply OHS practices

UEENEEE002A      Dismantle, assemble and fabricate electrotechnology components

UEENEEE003A      Solve problems in extra-low voltage single path circuits

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      3      Writing      3      Numeracy      3

### **Application of the Unit**

3)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

### **License to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to

occupational health and safety and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to maintain and repair facilities

- 1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
- 1.4 The nature and location of service facilities is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Maintain and repair facilities

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed

- |   |   |   |   |
|---|---|---|---|
|   | 2.2   | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures  |   |
|   | 2.2   | Prescribed procedures are used to check and identify deterioration and damage to facilities   |   |
|   | 2.4   | Faulty and damaged facilities are repaired using routine procedures   |   |
|   | 2.5   | Maintenance and repairs are carried out safely and within the prescribed limits, routines and procedures  |   |
|   | 2.6   | Procedures are followed for referring non-routine events to immediate supervisor for directions   |   |
|   | 2.7   | Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services |   |
|   | 2.8   | Routine quality checks are carried out in accordance with work instructions   |   |
| 3 | Complete maintenance and repair work report | 3.1   | OHS work completion risk control measures and procedures are followed   |
|   |   | 3.2   | Work site is cleaned and made safe in accordance with routine procedures  |
|   |   | 3.3   | Procedures are followed for referring maintenance issues beyond the scope of prescribed work to persons of higher authority |
|   |   | 3.4   | Work carried out is reported to the work supervisor through the established maintenance reporting procedures                |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining and repairing facilities associated with remote area essential service operations. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.18.1 | Occupational Health and Safety principles       |
| 2.18.4 | Remote area power supply safe working practices |
| 2.20.5 | Remote area essential services facilities       |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to maintaining and repairing facilities associated with to least two different remote area essential service operations

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain and repair facilities associated with remote area essential service operations as described in 7) and including:
    - A Understanding the location and nature of the work required
    - B Identifying deterioration and damage to facilities correctly
    - C Carrying out maintenance and repairs effectively
    - D Identifying maintenance issues beyond the scope of prescribed work and notifying appropriate persons
    - E Documenting work activities accurately
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining and repairing facilities associated with remote area essential service operations.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) must be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.7; 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>	<b>Example of Application</b>
1   Developing and using skills within	Refer to the following Performance Criteria for examples of application:

	a real workplace	All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEK018A **Maintain operation of remote area water facilities**

### **Unit Descriptor**

1)

This unit covers maintenance of remote area water collection, storage and treatment facilities. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of water facility faults using routine procedures and completing the necessary maintenance reporting.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK017A	Maintain and repair facilities associated with remote area essential service operations
-------------	---

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
---------	---	---------	---	----------	---

### **Application of the Unit**

3)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

### **License to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting

equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.  
 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

**Competency Field**

**4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Maintain operation of remote area water facilities

- 1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
- 1.4 The nature and location of the water facility is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Maintain operation of remote area water facilities

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed
- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.3 Prescribed maintenance procedures are used to test and check remote area water facilities

- |   |                                      |   |
|---|--------------------------------------|---|
|   | 2.4                                  | Known types of remote area water facilities functional faults are identified and repaired using routine procedures  |
|   | 2.5                                  | Maintenance, including performance measurements and repairs, are carried out safely and to prescribed routines and procedures   |
|   | 2.6                                  | Procedures are followed for referring non-routine events to immediate supervisor for directions   |
|   | 2.7                                  | Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services |
|   | 2.8                                  | Routine quality checks are carried out in accordance with work instructions   |
| 3 | Complete maintenance work and report | 3.1 OHS work completion risk control measures and procedures are followed   |
|   |                                      | 3.2 Work site is cleaned and made safe in accordance with routine procedures  |
|   |                                      | 3.3 Procedures are followed for referring maintenance issues beyond the scope of prescribed work to persons of higher authority   |
|   |                                      | 3.4 Work carried out is reported to the work supervisor through the established maintenance reporting procedures  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining operation of remote area water facilities. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.18.1 | Occupational Health and Safety principles       |
| 2.18.4 | Remote area power supply safe working practices |
| 2.20.8 | Remote area essential services water facilities |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to maintaining operation of at least two different remote area water facilities.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain operation of remote area water facilities as described in 7) and including:
    - A Understanding the location and nature of the work required
    - B Following prescribe procedures to testing and checking facility.
    - C Identifying and repairing known functional faults.
    - D Carrying out maintenance and repairs effectively.
    - E Identifying maintenance issues beyond the scope of prescribed work and notifying appropriate persons.
    - F Documenting work activities accurately.
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining operation of remote area water facilities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) must be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.7; 2.5	1

### **Skills Enabling Employment**

#### **8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEK019A **Maintain operation of remote area waste water facilities**

### **Unit Descriptor**

1)

This unit covers maintenance of remote area waste water facilities. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types waste water faults using routine procedures and completing the necessary maintenance reporting.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK017A	Maintain and repair facilities associated with remote area essential service operations
-------------	---

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

### **License to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments

such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

**Competency Field**

4)

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Maintain operation of remote area waste water facilities

- 1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
- 1.4 The nature and location of the waste water facility is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Maintain operation of remote area waste water facilities

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed
- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.3 Prescribed maintenance procedures are used to test and check remote area waste water facilities

- |   |                                      |   |
|---|--------------------------------------|---|
|   | 2.4                                  | Known types of remote area waste water facilities functional faults are identified and repaired using routine procedures  |
|   | 2.5                                  | Maintenance, including performance measurements and repairs, are carried out safely and to prescribed routines and procedures.  |
|   | 2.6                                  | Procedures are followed for referring non-routine events to immediate supervisor for directions   |
|   | 2.7                                  | Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services |
|   | 2.8                                  | Routine quality checks are carried out in accordance with work instructions   |
| 3 | Complete maintenance work and report | 3.1 OHS work completion risk control measures and procedures are followed   |
|   |                                      | 3.2 Work site is cleaned and made safe in accordance with routine procedures  |
|   |                                      | 3.3 Procedures are followed for referring maintenance issues beyond the scope of prescribed work to persons of higher authority   |
|   |                                      | 3.4 Work carried out is reported to the work supervisor through the established maintenance reporting procedures  |

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining operation of remote area waste water facilities. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.18.1 | Occupational Health and Safety principles             |
| 2.18.4 | Remote area power supply safe working practices       |
| 2.20.7 | Remote area essential services waste water facilities |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to maintaining operation of at least two different remote area waste water facilities.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain operation of remote area waste water facilities as described in 7) and including:
    - A Understanding the location and nature of the work required
    - B Following prescribe procedures to testing and checking facility.
    - C Identifying and repairing known functional faults
    - D Carrying out maintenance and repairs effectively.
    - E Identifying maintenance issues beyond the scope of prescribed work and notifying appropriate persons.
    - F Documenting work activities accurately.

- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining operation of remote area waste water facilities.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) must be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.7; 2.5	1

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEK020A **Maintain operation of remote area power plant**

### **Unit Descriptor**

1)

This unit covers maintenance of remote area power plant where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of power plant faults using routine procedures and completing the necessary maintenance reporting..

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK017A	Maintain and repair facilities associated with remote area essential service operations
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### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

### **License to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltages above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage

electrical installations is incorporated in unit UEENEEG005A and all prerequisite units it specifies.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Maintain operation of remote area power plant

- 1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
- 1.4 The nature and location of the power plant is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2	Maintain operation of remote area power plant	2.1	Established OHS risk control measures and procedures for carrying out the work are followed
		2.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
		2.3	Prescribed maintenance procedures are used to test and check remote area power plant
		2.4	Known types of remote area power plant functional faults are identified and repaired using routine procedures
		2.5	Maintenance, including performance measurements and repairs are carried out safely and to prescribed routines and procedures
		2.6	Procedures are followed for referring non-routine events to immediate supervisor for directions
		2.7	Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
		2.8	Routine quality checks are carried out in accordance with work instructions
3	Complete maintenance work and report	3.1	OHS work completion risk control measures and procedures are followed
		3.2	Work site is cleaned and made safe in accordance with routine procedures
		3.3	Procedures are followed for referring maintenance issues beyond the scope of prescribed work to persons of higher authority
		3.4	Work carried out is reported to the work supervisor through the established maintenance reporting procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining operation of remote area power plant. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.18.1 Occupational Health and Safety principles

2.18.4 Remote area power supply safe working practices

2.20.6 Remote area essential services power plant

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to maintaining operation of at least two different remote area power plants.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety

and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Maintain operation of remote area power plant as described in 7) and including:
    - A Understanding the location and nature of the work required
    - B Following prescribe procedures to testing and checking plant.
    - C Identifying and repairing known functional faults
    - D Carrying out maintenance and repairs effectively.
    - E Identifying maintenance issues beyond the scope of

prescribed work and notifying appropriate persons.

- F Documenting work activities accurately.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in maintaining operation of remote area power plant.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety units(s) must be reassured in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 2.7; 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.7; 2.5	1

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEK021A Manage renewable energy projects

### Unit Descriptor

1)

This unit covers the management of renewable energy projects involving design, modifications, installation, and/or maintenance of systems and equipment. The unit encompasses covers management of safety, budget, variation, personnel, resources, and critical path timelines all necessary progress and completion documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit must be assessed only after the technical units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Renewable and Sustainable Energy

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Establish the scope of the project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.3 Project deliverables and budget are identified from project planning and other relevant documentation and from discussions with appropriate person(s)</p> <p>1.3 Measurable outcomes are identified to evaluate the project on completion from project planning and other relevant documentation</p> <p>1.4 Plant, materials and skills needed to meet project outcome are identified from project planning and other relevant documentation</p> <p>1.5 Processes and procedures are developed for managing contract variations from discussions with appropriate person(s) and in accordance with contractual agreement</p>
2 Manage project.	<p>2.1 OHS policies, procedures and programs are implemented and monitored</p> <p>2.2 Achievement of project outcomes is delegated to appropriately competent persons involved in the project</p> <p>2.3 Risk events are identified and project plan strategies implemented to ensure that outcomes are achieved to the required standard of quality specified in the contract and safety required by organisation policy</p> <p>2.4 Procurement processes and procedures are monitored to ensure on-time supply of plant and materials and in accordance with organisation policy</p> <p>2.5 Project is progress is monitored against schedule, quality requirements and budget</p> <p>2.6 Conflict issues at the work site and between stakeholders, clients and regulators are identified and managed in accordance with organisation policy</p> <p>2.7 Variations are managed in accordance with agreed processes and in accordance with the contract</p>

	2.8	Project records are maintained and progress reports written and forwarded to all appropriate person(s)
3 Complete project.	3.1	Project outcomes are reviewed against original plan, implemented risk strategies, contract variations, safety record and budget
	3.2	Project completion acceptance is sought from appropriate person(s) and handover documented in accordance with organisation policy

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and managing renewable energy projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.17	Project management
2.2.19	Customer/Client relations
2.2.32	Renewable energy industry sector customs and practices
2.18.8.2	Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to managing an industry accepted medium sized renewable energy project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Manage renewable energy projects as described in 7) and including:
    - A Establishing the scope of the project accurately,
    - B Ascertaining the input a project
    - C Developing effective management processes,
    - D Managing resources and variations effectively
    - E Resolving conflicts
    - F Adopting risk management strategies
    - G Maintaining records and submitting progress reports
    - H Meeting project outcomes
    - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in managing renewable energy projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2 to 1.4; 2.6 to 2.8	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: All	3

How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.3; 2.5; 2.7; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3; 2.6	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: All	2

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 2.3; 2.7; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 2.1 to 2.8; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5

6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6
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## UEENEEK022A Plan renewable energy projects

### Unit Descriptor

1)

This unit covers development and documentation of renewable energy project proposals, milestones and completions. The unit encompasses, establishing budgets, critical path analysis, development of workflow strategies, documenting, presenting and negotiating budgets and timelines.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Competency in this unit must be assessed only after the technical units in a qualification have been achieved.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 6 level or higher.

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Renewable and Sustainable Energy

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Prepare to plan project.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established techniques for project planning are reviewed are adopted in accordance with organisation policies</p> <p>1.3 The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s)</p>
2 Develop project plan proposal.	<p>2.1 Estimated plant, material, labour and other costs are sought and obtained from appropriate person(s) in accordance with organisation policies and procedures</p> <p>2.2 Project budget is established from estimated plant, material, labour and other costs in accordance with organisation policies and procedures</p> <p>2.3 Knowledge of critical path analysis is applied to developing workflow strategies</p> <p>2.4 Sources and availability of materials and human resources needed for the project are identified in accordance with organisation policies and procedures.</p> <p>2.5 Risk management strategies are sought and obtained for incorporating in the project plan</p> <p>2.6 Project plan is reviewed against all inputs and adjusted to rectify any anomalies</p> <p>2.7 Project plan proposal is documented in accordance with organisation policies and procedures</p>
3 Obtain approval for project plan.	<p>3.1 Project plan is presented and discussed with person(s) of higher authority</p> <p>3.2 Alterations to the project plan resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation policy</p>

- 3.3 Final project plan is documented and approval obtained from appropriate person(s)

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and planning renewable energy projects. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.16.1 Project planning
- 2.2.18.2 Critical path and project analysis
- 2.2.32 Renewable energy industry sector customs and practices
- 2.18.8 Occupational Health and Safety, enterprise responsibilities

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to managing an industry accepted medium sized renewable energy project.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances,

assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Plan renewable energy projects as described in 7) and including:
    - A Determining the project requirements accurately,
    - B Establishing a project budget
    - C Developing effective work flow strategies,
    - D Documenting project plan proposal
    - E Negotiating alterations to the proposed project plan successfully
    - F Obtaining approval of the final plan
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in planning renewable energy projects.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and

incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6; 2.3; 2.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4 to 1.6	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6; 2.1; 3.1	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 1.6; 3.1; 3.2	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 1.6 to 3.2	2

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.4; 1.6; 3.1
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4; 3.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4; 3.1; 3.2
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  1.7 to 3.2

## **UEENEEK023A Carry out basic repairs to renewable energy apparatus by replacement of components**

### **Unit Descriptor**

**1)**

This unit deals with the replacement of electrical and non-electrical components of renewable energy apparatus. It encompasses safe working practices, following written and oral instructions and procedures, basic testing techniques, disconnecting and reconnecting electrical/electronic components, dismantling and assembling apparatus and reporting repair activities.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE004A      Solve problems in multiple path d.c circuits

UEENEEE008A      Lay wiring/cabling and terminate accessories for extra-low voltage circuits

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading      3      Writing      3      Numeracy      3

### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as

apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to repair renewable energy apparatus.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures
- 1.2 Established OHS risk control measures and procedures in preparation for the work are followed
- 1.3 The nature of the repair is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
- 1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
- 1.6 Tools, apparatus and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Repair renewable energy apparatus.

- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

- 2.3 Circuits/apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Apparatus is dismantled in accordance with manufacturer's guide and supervisor's instructions
- 2.5 Component parts are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage
- 2.6 Repairs are affected efficiently without damage to other components, apparatus or circuits.
- 2.7 Apparatus is assembled in an appropriate sequence with all parts placed, secured and connected in accordance with manufacturer guide or industry practice
- 2.8 Procedures are followed for referring non-routine events to immediate supervisor for directions
- 2.9 Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices
- 3 Complete and report repair work activities.
  - 3.1 OHS work completion risk control measures and procedures are followed
  - 3.2 Repaired apparatus is prepared for testing by an appropriate person
  - 3.3 Work area is cleaned and made safe in accordance with established procedures
  - 3.4 Work supervisor is notified of the completion of the repair work in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and carrying out basic repairs to renewable energy apparatus by replacement of components. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical safe working practices
- 2.20.3 Introduction to renewable energy technologies

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to carrying out basic repairs renewable energy apparatus limited to replacement or repair of components in which the fault has been previously established. This must include at least two different renewable energy apparatus in which three different types of components are faulty one of which is mechanical.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to

consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Carry out basic repairs to renewable energy apparatus by replacement of components as described in 7) and including:
    - A Following manufactures service instructions for access to components
    - B Removing at least three different types of components specified in the work instructions
    - C Replacing components to manufacturer requirements.
    - D Reassembling the apparatus correctly.
    - E Testing apparatus operation
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate

solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in carrying out basic repairs to renewable energy apparatus by replacement of components.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE002A	Dismantle, assemble and fabricate electro technology components
UEENEEE003A	Solve problems in single path extra low voltage circuits
UEENEEE004A	Solve problems in multiple path d.c. circuits
UEENEEE007A	Use drawings, diagrams, schedules and manuals

UEENEEE019A Solve problems in multiple path a.c. circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) must be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 3.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.7	1

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.4 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.8

## **UEENEEK024A Assemble and set up photovoltaic apparatus in domestic dwellings**

### **Unit Descriptor**

**1)**

This unit covers installing of photovoltaic apparatus in domestic dwellings. It encompasses safe working practices; secure placement and connection of apparatus, following written and oral instruction and procedures and customer relations.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK025A Solve basic problems in photovoltaic energy apparatus

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

### **Application of the Unit**

**3)**

This unit is intended for competency development in entry-level employment-based programs incorporated in approved contracts of training.

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltages above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG005A and all prerequisite units it specifies

Practice in the workplace and during training is also subject to

regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to install photovoltaic apparatus.

- 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines
- 1.2 Established OHS risk control measures are followed in preparation for the work
- 1.3 Safety hazards, which have not previously been identified, are reported and advice on risk control measures, are sought from the work supervisor
- 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken
- 1.5 Advice is sought from the work supervisor and/or other appropriate person(s) to ensure the work is coordinated effectively with others
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Install photovoltaic apparatus.

- 2.1 Established OHS risk control measures for carrying out the work are followed

- 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.3 Photovoltaic apparatus are installed to comply standards and job specifications with sufficient space to affect terminations
- 2.4 Accessories are installed straight and square in the required locations and within acceptable tolerances
- 2.5 Cables and conductors are terminated at accessories/apparatus in accordance with manufacturer specifications and regulatory requirements
- 2.6 Non-routine events are referred to immediate supervisor for directions
- 2.7 The installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices
- 3 Adjust and set up apparatus.
  - 3.1 OHS work set-up and completion risk control measures and procedures are followed
  - 3.2 Routine procedures are followed to set up and adjust apparatus ready for use.
  - 3.3 Work site is cleaned and made safe in accordance with established procedures
  - 3.4 Work supervisor is notified of the completion of the installation work and apparatus documentation is forwarded to appropriate persons in accordance with established routines

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and assembling and setting up photovoltaic apparatus in domestic dwellings. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.5.5 Technical standards, regulations and codes for extra-low voltage work
- 2.18.1 Occupational Health and Safety principles
- 2.18.9 Electronic Safe working practice

2.20.13 Photovoltaic installations

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by assembling and setting up two different types of photovoltaic apparatus in domestic dwellings on at least two occasions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

**EVIDENCE GUIDE**

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to

consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Assemble and set up photovoltaic apparatus in domestic dwellings as described in 7) and including:
    - A Reading and interpreting drawings of circuit arrangements and component locations.
    - B Placing and securing apparatus and accessories accurately
    - C Maintaining fire integrity
    - D Terminating cable and conductors correctly
    - E Connecting apparatus to manufacturer instructions
    - F Setting functional controls to customer's requirements

- G Completing necessary documentation including handing over apparatus documents to the customer
- H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in assembling and setting up photovoltaic apparatus in domestic dwellings.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE002A	Dismantle, assemble and fabricate electro technology components
UEENEEE005A	Fix and secure equipment

UEENEEE007A Use drawings, diagrams, schedules and manuals

UEENEEE008A Lay wiring and terminate accessories for extra-low voltage circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) must be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.7	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5; 3.2	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5	1
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**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.6

## UEENEEK025A Solve basic problems in photovoltaic energy apparatus

### Unit Descriptor

1)

This unit covers providing known solutions to predictable problems in photovoltaic energy apparatus operated at extra-low voltage. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable circuit problems.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed..

UEENEEK023A Carry out basic repairs to renewable energy apparatus by replacement of components

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

### Application of the Unit

3)

This unit is intended for competency development in entry-level employment-based programs incorporated in approved contracts of training.

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltages above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work..

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG005A and all prerequisite units it specifies

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to work on photovoltaic energy apparatus

- 1.1 OHS procedures for a given work area are obtained and understood
- 1.2 OHS risk control work preparation measures and procedures are followed
- 1.3 The nature of the apparatus problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
- 1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve problem in photovoltaic energy apparatus

- 2.1 OHS risk control work measures and procedures are followed
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

	2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures
	2.4	Established routines are used to solve photovoltaic energy apparatus problems using measured and calculated values of apparatus operating parameters
	2.5	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices
3	Complete work and document problem solving activities.	
	3.1	OHS work completion risk control measures and procedures are followed
	3.2	Work site is cleaned and made safe in accordance with established procedures
	3.3	Justification for solutions used to solve photovoltaic energy apparatus problems is documented
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established routine procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and solving basic problems in photovoltaic energy apparatus. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practice
- 2.20.14 Photovoltaic power systems

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to photovoltaic energy apparatus as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following:

- In relation to at least three of the following types of photovoltaic

energy problems and on at least two occasions:

- determining the operating parameters of an existing apparatus
- identifying and locating electrical faults
- identifying and locating mechanical fault

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve basic problems in photovoltaic energy apparatus as described in 7) and including:
    - A Understanding the nature of the problem
    - B Using established routines to solve apparatus problems
    - C Providing viable solutions to apparatus problems.
    - D Documenting justification for the solutions used
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

**assessment**

This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving basic problems in photovoltaic energy apparatus.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) must be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.1; 1.3; 1.4; 2.1	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.5; 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEK026A    Install and set up grid connected photovoltaic power systems**

### **Unit Descriptor**

**1)**

This unit covers the installation, adjustment and set-up of photovoltaic power systems and connecting to a supply grid inverter. It encompasses working safely and to installation standards, matching components with that specified for a given location, placing and securing system components accurately, making required circuit connections and completing the necessary installation documentation.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK025A    Solve basic problems in photovoltaic energy apparatus

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading    3    Writing    3    Numeracy    3

### **Application of the Unit**

**3)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltages above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work..

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG005A and all prerequisite units it specifies

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to install photovoltaic power systems.

- 1.1 OHS procedures for a given work area are obtained and understood
- 1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented
- 1.4 Installation of the system is prepared in consultation with others effected by the work and sequenced appropriately
- 1.5 The nature and location of the work is determined from documentation or appropriate person to establish the scope of work to be undertaken
- 1.6 Location of system components is planned within the constraints of the building structure, significant and regulations
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others
- 1.8 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements

- |   |  |   |
|---|--|---|
|   | 1.9  | Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety                |
|   | 1.10   | Preparatory work is checked to ensure no damage has occurred and complies with requirements   |
| 2 | Install photovoltaic power systems.            |   |
|   | 2.1  | OHS risk control measures and procedures for carrying out the work are followed   |
|   | 2.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures                                 |
|   | 2.3  | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures  |
|   | 2.4  | System components are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance        |
|   | 2.5  | Wiring is terminated at components and associated equipment in accordance with manufacturer specifications and functional and regulatory requirements                                       |
|   | 2.6  | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented  |
|   | 2.7  | Unexpected situations are dealt with safely and with the approval of an authorised person   |
|   | 2.8  | Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures   |
|   | 2.9  | System installation is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles |
| 3 | Completion and report installation activities. |   |
|   | 3.1  | OHS work completion risk control measures and procedures are followed   |
|   | 3.2  | Work site is cleaned and made safe in accordance with established procedures  |

- 3.3 Final checks are made so that the installed apparatus conforms to requirements
- 3.4 ‘As-installed’ apparatus and associated equipment is documented and appropriate person(s) notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and installing and setting up grid connected photovoltaic power systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practice
- 2.20.19 Grid connected inverters

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to installing photovoltaic power systems in at least two different types of premises construction or environment.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and set up grid connected photovoltaic power systems as described in 7) and including:
    - A Reading and interpreting drawings related to and apparatus locations and circuit connections
    - B Placing and securing system components accurately
    - C Maintaining fire integrity
    - D Connecting system components to comply with requirements
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and setting up grid connected photovoltaic power systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) must be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2; 2.7	1

How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.5	1
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### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEK027A Diagnose faults in renewable energy control systems

### Unit Descriptor

1)

This unit covers diagnosing and rectifying faults in renewable energy control systems. It encompasses working safely, reading circuit diagrams, sketching diagrams from traced wiring, logically applying fault finding procedures, conducting repairs and completing the necessary service documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK025A Solve basic problems in photovoltaic energy apparatus

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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### Application of the Unit

3)

This unit is intended to apply to any formal recognition for this standard at the aligned AQF 4 level or higher.

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltages above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work..

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG005A and all prerequisite units it specifies

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as

apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to Diagnose and rectify faults.

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 OHS risk control measures and procedures are followed in preparation for the work
- 1.3 The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s)
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
- 1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with established procedures and checked for correct operation and safety

2 Diagnose and rectify faults.

- 2.1 OHS risk control measures and procedures for carrying out the work are followed
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
  - 2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel
  - 2.5 Fault finding is approached methodically drawing on knowledge of renewable energy systems and interconnecting circuits using measured and calculated values of circuit/apparatus parameters
  - 2.6 Circuit/apparatus components are dismantled where necessary and parts stored to protect them against loss or damage
  - 2.7 Faulty circuits/components are rechecked and their fault status confirmed
  - 2.8 Materials/replacement parts required to rectify faults are sourced and obtained in accordance with established procedures
  - 2.9 Effectiveness of the repair is tested in accordance with established procedures
  - 2.10 Apparatus is reassembled, finally tested and prepared for return to service
  - 2.11 Unexpected situations are dealt with safely and with the approval of an authorised person
  - 2.12 Fault finding and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices
- 3 Completion and report fault finding and repair activities.
- 3.1 OHS work completion risk control measures and procedures are followed
  - 3.2 Work area is cleaned and made safe in accordance with established procedures
  - 3.3 Written justification is made for repairs to apparatus
  - 3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and diagnosing faults in renewable energy control systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.3	Fault finding techniques
2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practice
2.20.15	Renewable energy system electronics

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to finding and repairing any four of the following faults in renewable energy systems:

- Open-circuit
- Short-circuit
- Incorrect connections
- Insulation failure
- Unsafe condition
- Apparatus/component failure
- Related mechanical failure

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Diagnose faults in renewable energy control systems as described in 7) and including:
    - A Envisaging the likely extent of work from fault/breakdown reports and discussion with appropriate persons
    - B Using methodical fault finding techniques
    - C Finding faults efficiently
    - D Rectifying faults effectively
    - E Completing documentation correctly
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in diagnosing faults in renewable energy control systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) must be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 1.4	1
How are mathematical ideas	Refer to the following Performance Criteria for examples of application:	

and techniques used?	2.5 to 2.8	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.5 to 2.8	2

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.9; 3.2; 3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.4 to 2.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-	Refer to the following Performance Criteria for examples of application:

	routine or contingent situations	2.11
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## UEENEEK028A **Solve basic problems in stand-alone renewable energy systems**

### **Unit Descriptor**

1)

This unit covers providing known solutions to predictable problems in stand-alone renewable energy systems operated at extra-low voltage. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable circuit problems.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK023A      Carry out basic repairs to renewable energy apparatus by replacement of components

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development in entry-level employment-based programs incorporated in approved contracts of training.

### **License to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltages above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work..

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG005A and all prerequisite units it specifies

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to work on stand-alone renewable energy systems

- 1.1 OHS procedures for a given work area are obtained and understood
- 1.2 OHS risk control work preparation measures and procedures are followed
- 1.3 The nature of the apparatus problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
- 1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

2 Solve problem in stand-alone renewable energy systems

- 2.1 OHS risk control work measures and procedures are followed
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures

	2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures	
	2.4	Established routines are used to solve stand-alone renewable energy systems problems using measured and calculated values of apparatus operating parameters	
	2.5	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices	
3	Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed
		3.2	Work site is cleaned and made safe in accordance with established procedures
		3.3	Justification for solutions used to solve stand-alone renewable energy systems problems is documented
		3.4	Work completion is documented and appropriate person(s) notified in accordance with established routine procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and solving basic problems in stand-alone renewable energy systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.18.1	Occupational Health and Safety principles
2.18.2	Electrical Safe working practice
2.20.9.1	Stand alone renewable energy system components

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to stand-alone renewable energy systems as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following:

- In relation to at least three of the following types of stand-alone renewable energy system problems and on at least two occasions:
  - Open-circuit
  - Short-circuit
  - Incorrect connections
  - Insulation failure
  - Unsafe condition
  - Apparatus/component failure
  - Related mechanical failure

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety

and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve basic problems in stand-alone renewable energy systems as described in 7) and including:
    - A Understanding the nature of the problem
    - B Using established routines to solve apparatus problems
    - C Providing viable solutions to apparatus problems.
    - D Documenting justification for the solutions used
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving basic problems in stand-alone renewable energy systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) must be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.1	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.5; 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4	1

### **Skills Enabling Employment**

#### **8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEK029A Design renewable energy heating systems

### Unit Descriptor

1)

This unit covers the design of renewable energy heating systems and their installation. It encompasses following design briefs, incorporating schemes for protection of persons and property from dangers of system malfunction, ensuring other safety and performance standards and functional requirements are met and documenting design calculations and criteria..

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK028A Solve problems in stand-alone renewable energy systems

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 4 level or higher.

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

**Competency Field**

4)

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to design renewable energy heating systems.

1.1 OHS procedures for a given work area are obtained and understood

1.2 The extent and nature of the electrical installation is determined from design brief

1.3 Safety and other regulatory requirements to which the electrical installation must comply are obtained and understood

1.4 Design development work is planned to meet scheduled timelines in consultation with others persons involved in the installation or associated work

2 Develop renewable energy heating systems design.

2.1 Knowledge of renewable energy heating systems performance standards, compliance methods is applied to the design

2.2 Alternative arrangements for the heating systems design are considered based on the requirements outlined in the design brief

2.3 Safety, functional and budgetary considerations are incorporated in the design

2.4 Heating systems design draft is checked for compliance with the design brief and regulatory requirements

2.5 Heating systems design is documented for submission to appropriate persons for acceptance and approval

2.6 Solutions to unplanned situation are provided consistent with organisation policy

3 Obtain approval for renewable energy heating systems design.

3.1 Heating systems design is presented and explained to client representative and/or other relevant persons

- 3.2 Requests for alterations to the design are negotiated with relevant persons within the constraints of organisation policy
- 3.3 Final design is documented and approval obtained from appropriate persons.
- 3.4 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and designing renewable energy heating systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.18.2 Thermodynamics
- 2.18.1 Occupational Health and Safety principles
- 2.20.18 Solar water heating systems
- 2.20.20 Renewable energy heating

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing renewable energy heating systems and their installation.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design renewable energy heating systems as described in 7) and including:
    - A Developing outlines of alternative designs,
    - B Developing the design within the safety and functional requirements and budget limitations,
    - C Documenting and presenting design effectively,
    - D Successfully negotiating design alteration requests
    - E Obtaining approval for final design
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing renewable energy heating systems.

**Method of**

**8.4)**

**assessment**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED001A Use basic computer applications’

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills	Refer to the following Performance Criteria for examples of application:	

applied?	2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENED001A Use basic computer applications'

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEK030A Solve basic problems in wind energy conversion systems**

### **Unit Descriptor**

1)

This unit covers providing known solutions to predictable problems in wind energy conversion systems. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable circuit problems

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK023A	Carry out basic repairs to renewable energy apparatus by replacement of components
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### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development in entry-level employment-based programs incorporated in approved contracts of training.

### **License to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltages above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG005A and all prerequisite units it specifies.

Practice in the workplace and during training is also subject to

regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to work on wind energy conversion systems

- 1.1 OHS procedures for a given work area are identified, obtained and understood.
- 1.2 OHS risk control work preparation measures and procedures are followed.
- 1.3 The nature of the apparatus problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
- 1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
- 1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
- 1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

2 Solve problem in wind energy conversion systems

- 2.1 OHS risk control work measures and procedures are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

- |   |  |  |
|---|--|--|
|   | 2.3  | Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures  |
|   | 2.4  | Established routines are used to solve wind energy conversion systems problems using measured and calculated values of apparatus operating parameters. |
|   | 2.5  | Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.             |
| 3 | Complete work and document problem solving activities. |  |
|   | 3.1  | OHS work completion risk control measures and procedures are followed.   |
|   | 3.2  | Work site is cleaned and made safe in accordance with established procedures.  |
|   | 3.3  | Justification for solutions used to solve wind energy conversion systems problems is documented.   |
|   | 3.4  | Work completion is documented and appropriate person(s) notified in accordance with established routine procedures.                                    |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and solving basic problems in wind energy conversion systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |           |   |
|-----------|---|
| 2.18.1    | Occupational Health and Safety principles |
| 2.18.2    | Electrical Safe working practices         |
| 2.20.16.1 | Fundamentals of wind energy conversion    |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to wind energy conversion systems as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following:

- In relation to at least three of the following types of wind energy conversion system problems and on at least two occasions:

- determining the operating parameters of an existing apparatus
- identifying and locating electrical fault
- identifying and locating mechanical fault

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

**8)** This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Solve basic problems in wind energy conversion systems as described in 7) and including:
    - A Understanding the nature of the problem
    - B Using established routines to solve apparatus problems
    - C Providing viable solutions to apparatus problems.
    - D Documenting justification for the solutions used
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

**assessment**

This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in solving basic problems in wind energy conversion systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE001A and other discipline specific occupational health and safety unit(s) must be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.3; 3.4	1
How can information be collected, analysed	Refer to the following Performance Criteria for examples of application:	

and organised?	1.1; 1.3; 1.4; 2.1	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.5; 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.4	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.4	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.4	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and	Refer to the following Performance Criteria for examples of application:

	process of work task	3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.2 to 1.6
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEK031A Design wind energy conversion systems rated to 10 kW**

### **Unit Descriptor**

**1)**

This unit covers the design of wind energy conversion systems and their installation. It encompasses following design briefs, incorporating schemes for protection of persons and property from dangers of system malfunction, ensuring other safety and performance standards and functional requirements are met and documenting design calculations and criteria.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK030A      Solve basic problems in wind energy conversion systems

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1	Prepare to design wind energy conversion systems	1.1	OHS processes and procedures for a given work area are identified, obtained and understood
		1.2	The extent and nature of the system is determined from design brief
		1.3	Safety and other regulatory requirements to which the electrical installation must comply are identified, obtained and understood
		1.4	Design development work is planned to meet scheduled timelines in consultation with others persons involved in the installation or associated work
2	Develop wind energy conversion systems design.	2.1	Knowledge of wind energy conversion systems performance standards, compliance methods is applied to the design
		2.2	Alternative arrangements for the wind energy systems design are considered based on the requirements outlined in the design brief
		2.3	Safety, functional and budgetary considerations are incorporated in the design
		2.4	Wind energy system design draft is checked for compliance with the design brief and regulatory requirements
		2.5	Wind energy system design is documented for submission to appropriate persons for acceptance and approval
		2.6	Solutions to unplanned situation are provided consistent with organisation policy
3	Obtain approval for wind energy conversion systems design.	3.1	Wind energy system design is presented and explained to client representative and/or other relevant persons

- 3.2 Requests for alterations to the design are negotiated with relevant persons within the constraints of organisation policy
- 3.3 Final design is documented and approval obtained from appropriate persons
- 3.4 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and designing wind energy conversion systems rated to 10 kW. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.18.1 Occupational Health and Safety principles

2.20.16.2 Wind energy conversion systems

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different wind energy conversion systems and their installation.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design wind energy conversion systems rated to 10 kW as described in 7) and including:
    - A Developing outlines of alternative designs,
    - B Developing the design within the safety and functional requirements and budget limitations,
    - C Documenting and presenting design effectively,
    - D Successfully negotiating design alteration requests
    - E Obtaining approval for final design
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing wind energy conversion systems rated to 10 kW.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENED001A      Use basic computer applications

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2

Note

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with ‘UEENEED001A Use basic computer applications’

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEK032A      Develop strategies to address sustainability issues**

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers developing strategies to address greenhouse gases and sustainability issues. It encompasses working safely, apply extensive knowledge of sustainable energy systems and components and their operating parameters, gathering and analysing data, applying problem solving techniques, developing and documenting alternatives solutions.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  There are no prerequisite competencies for this unit.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      5      Writing      5      Numeracy      5
<b>Application of the Unit</b>	<b>3)</b>  This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 4 or higher.
<b>License to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.
<b>Competency Field</b>	<b>4)</b>  Renewable and Sustainable Energy

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Prepare to develop strategies to address sustainability issues.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work</p> <p>1.3 The extent of the sustainability issues are determined from performance specifications and situation reports and in consultation with relevant persons</p> <p>1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work</p> <p>1.5 Effective strategies are determined to ensure solution development and implementation is carried out efficiently</p>
2 Develop strategies to address sustainability issues	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed</p> <p>2.2 Knowledge of sustainability is applied to developing strategies to address greenhouse gas and sustainability issues</p> <p>2.3 Parameters, specifications and performance requirements in relation to sustainability issues are set in accordance with established procedures</p> <p>2.4 Approaches to resolving sustainability issues are analysed to provide most effective solutions</p> <p>2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy</p> <p>2.6 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards</p>
3 Document strategies to address sustainability issues.	3.1 Solutions to sustainability issues are tested to determine their effectiveness and modified where necessary

- 3.2 Adopted solutions are documented, including instructions for implementation that incorporates risk control measures to be followed
- 3.3 Appropriately competent and qualified persons required to implement solutions to sustainability issues are coordinated in accordance with regulatory requirements and enterprise policy (See Note)
- 3.4 Justification for strategies used to solve sustainability issues is documented for inclusion in work/project development records in accordance with professional standards

Note:

A licence or permit to practise in the workplace is required for specified work on building and premises

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and developing strategies to address sustainability issues. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.1 Occupational Health and Safety principles
- 2.20.11 Sustainability and greenhouse reduction strategies

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to developing strategies to address sustainability issues for at least four renewable energy problems.

Note.

Typical sustainability issues are those encountered in meeting sustainability performance standards, such as reducing needs for energy use, reducing causes of greenhouse gas emissions, revising a energy system operating parameters and dealing with energy system efficiencies.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

**Overview of Assessment**

**8.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified

in the Performance Criteria and Range Statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop strategies to address sustainability issues as described in 7) and including:
    - A Understanding the extent of the renewable energy problem
    - B Forming effective strategies for solution development and implementation
    - C Obtaining renewable energy system/component parameters, specifications and performance requirements appropriate to each problem
    - D Testing solutions to renewable energy problems
    - E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed
    - F Documenting justification of solutions implemented in accordance with professional standards
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing strategies to address sustainability issues.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) must be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and	Refer to the following Performance Criteria for examples of application:	

organised?	1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2 to 2.4; 3.1	3

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of	Refer to the following Performance Criteria for examples of application:

	the context of the work task	2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEK033A Design hybrid power systems

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the design of hybrid power systems and their installation. It encompasses following design briefs, incorporating schemes for protection of persons and property from dangers of system malfunction, ensuring other safety and performance standards and functional requirements are meet and documenting design calculations and criteria.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEK028A      Solve basic problems in stand-alone renewable energy systems</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.</p>						
<b>License to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Renewable and Sustainable Energy</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Prepare to design hybrid power systems	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 The extent and nature of the system is determined from design brief</p> <p>1.3 Safety and other regulatory requirements to which the electrical installation must comply are identified and understood</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others persons involved in the installation or associated work</p>
2 Develop hybrid power systems design	<p>2.1 Knowledge of hybrid power systems performance standards, compliance methods is applied to the design</p> <p>2.2 Alternative arrangements for the wind energy systems design are considered based on the requirements outlined in the design brief</p> <p>2.3 Safety, functional and budgetary considerations are incorporated in the design</p> <p>2.4 Wind energy system design draft is checked for compliance with the design brief and regulatory requirements</p> <p>2.5 Wind energy system design is documented for submission to appropriate persons for acceptance and approval</p> <p>2.6 Solutions to unplanned situation are provided consistent with organisation policy</p>
3 Obtain approval for hybrid power systems design	<p>3.1 Wind energy system design is presented and explained to client representative and/or other relevant persons</p> <p>3.2 Requests for alterations to the design are negotiated with relevant persons within the constraints of organisation policy</p> <p>3.3 Final design is documented and approval obtained from appropriate persons</p>

- 3.4 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and designing hybrid power systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.20.10 Hybrid Energy Systems

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different hybrid power systems and their installation.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Design hybrid power systems as described in 7) and including:
  - A Developing outlines of alternative designs
  - B Developing the design within the safety and functional requirements and budget limitations
  - C Documenting and presenting design effectively
  - D Successfully negotiating design alteration requests
  - E Obtaining approval for final design
  - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing hybrid power systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENED001A      Use basic computer applications

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: (See Note)	2

Note:  
Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEED001A Use basic computer applications'

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following

performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEK035A Design grid connected power supply systems**

### **Unit Descriptor**

**1)**

This unit covers the design of grid connected power supply systems and their installation. It encompasses following design briefs, incorporating schemes for protection of persons and property from dangers of system malfunction, ensuring other safety and performance standards and functional requirements are met and documenting design calculations and criteria

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK025A	Solve basic problems in photovoltaic energy apparatus
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### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

### **Competency Field**

**4)**

Renewable and Sustainable Energy

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Prepare to design grid connected power supply systems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 The extent and nature of the system is determined from design brief.</p> <p>1.3 Safety and other regulatory requirements to which the electrical installation must comply are identified, obtained and understood</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others persons involved in the installation or associated work.</p>
2 Develop grid connected power supply systems design.	<p>2.1 Knowledge of grid connected power supply systems performance standards, compliance methods is applied to the design.</p> <p>2.2 Alternative arrangements for the hybrid power systems design are considered based on the requirements outlined in the design brief.</p> <p>2.3 Safety, functional and budgetary considerations are incorporated in the design.</p> <p>2.4 Grid connected power supply system design draft is checked for compliance with the design brief and regulatory requirements.</p> <p>2.5 Grid connected power supply system design is documented for submission to appropriate persons for acceptance and approval.</p> <p>2.6 Solutions to unplanned situation are provided consistent with organisation policy.</p>
3 Obtain approval for grid connected power supply systems design	<p>3.1 Grid connected power supply system design is presented and explained to client representative and/or other relevant persons.</p> <p>3.2 Requests for alterations to the design are negotiated with relevant persons within the constraints of organisation policy.</p> <p>3.3 Final design is documented and approval obtained from appropriate persons.</p>

- 3.4 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and designing grid connected power supply systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.5.2.1 Technical standards, regulations and codes for general electrical installations
- 2.5.12 Electricity distributors, supply requirements
- 2.6.2.2 Electrical metering arrangements
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.20.19 Grid connected inverters

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different grid connected power supply systems and their installation.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships.

However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling

employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Design grid connected power supply systems as described in 7) and including:
    - A Developing outlines of alternative designs
    - B Developing the design within the safety and functional requirements and budget limitations
    - C Documenting and presenting design effectively
    - D Successfully negotiating design alteration requests
    - E Obtaining approval for final design
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing grid connected power supply systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENED001A      Use basic computer applications

**Key competencies**

**8.6)**  
Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  (See Note)	2

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with ‘UEENEED001A Use basic computer applications’

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEK037A Install and set up micro-hydro systems

### Unit Descriptor

1)

This unit covers the installation and adjustment and set-up of micro-hydro systems. It encompasses working safely and to installation standards, matching components with that specified for a given location, placing and securing system components accurately, making required circuit connections and completing the necessary installation documentation.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK023A	Carry out basic repairs to renewable energy apparatus by replacement of components
-------------	--

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### Application of the Unit

3)

This unit is intended for competency development in entry-level employment-based programs incorporated in approved contracts of training.

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG005A and all prerequisite units it specifies.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

**Competency Field 4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to install micro-hydro systems.

- 1.1 OHS procedures for a given work area are identified, obtained and understood
- 1.2 Health and safety risks are identified, and established risk control measures and procedures in preparation for the work are followed
- 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented
- 1.4 Installation of the system is prepared in consultation with others effected by the work and sequenced appropriately
- 1.5 The nature and location of the work is determined from documentation or appropriate person to establish the scope of work to be undertaken
- 1.6 Location of system components is planned within the constraints of the building structure, significants and regulations
- 1.7 Advice is sought from appropriate persons to ensure the work is coordinated effectively with others
- 1.8 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements

- |   |  |      |  |
|---|--|------|--|
|   |  | 1.9  | Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety                   |
|   |  | 1.10 | Preparatory work is checked to ensure no damage has occurred and complies with requirements  |
| 2 | Install micro-hydro systems.                   | 2.1  | OHS risk control measures and procedures are followed for carrying out the work  |
|   |  | 2.2  | The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures                                    |
|   |  | 2.3  | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures   |
|   |  | 2.4  | System components are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance           |
|   |  | 2.5  | Wiring is terminated at system components in accordance with manufacturer specifications and functional and regulatory requirements  |
|   |  | 2.6  | Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented   |
|   |  | 2.7  | Unexpected situations are dealt with safely and with the approval of an authorised person  |
|   |  | 2.8  | Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures  |
|   |  | 2.9  | Apparatus installation is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles |
| 3 | Completion and report installation activities. | 3.1  | OHS work completion risk control measures and procedures are followed  |
|   |  | 3.2  | Work site is cleaned and made safe in accordance with established procedures   |
|   |  | 3.3  | Final checks are made so that the installed apparatus conforms to requirements   |

- 3.4 'As-installed' apparatus and associated equipment is documented and appropriate person(s) notified in accordance with established procedures

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and installing and setting up micro-hydro systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.20.17.1 Micro-hydro systems installation and maintenance processes

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to installing micro-hydro systems in at least two different types of premises construction or environment.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However,

it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Install and set up micro-hydro systems as described in 7) and including:
    - A Reading and interpreting drawings related to and apparatus locations and circuit connections.
    - B Placing and securing system components accurately
    - C Maintaining fire integrity
    - D Connecting system components to comply with requirements
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in installing and setting up micro-hydro systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety units must be reassessed in relation to this unit.

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.8	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.5	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.6; 2.7	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  1.1; 2.7
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.4 to 1.8
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.8
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7

## UEENEEK038A Design micro-hydro systems

<b>Unit Descriptor</b>	<p><b>1)</b></p> <p>This unit covers the design of micro-hydro systems and their installation. It encompasses following design briefs, incorporating schemes for protection of persons and property from dangers of system malfunction, ensuring other safety and performance standards and functional requirements are met and documenting design calculations and criteria.</p>						
<b>Prerequisite Unit(s)</b>	<p><b>2)</b></p>						
<b>Competencies</b>	<p><b>2.1)</b></p> <p>Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.</p> <p>UEENEEK028A      Solve problems in stand-alone renewable energy systems</p>						
<b>Literacy and numeracy skills</b>	<p><b>2.2)</b></p> <p>Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">Reading</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Writing</td> <td style="text-align: center;">5</td> <td style="text-align: left;">Numeracy</td> <td style="text-align: center;">5</td> </tr> </table>	Reading	5	Writing	5	Numeracy	5
Reading	5	Writing	5	Numeracy	5		
<b>Application of the Unit</b>	<p><b>3)</b></p> <p>This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.</p>						
<b>License to practise</b>	<p><b>3.1)</b></p> <p>The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.</p>						
<b>Competency Field</b>	<p><b>4)</b></p> <p>Renewable and Sustainable Energy</p>						

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Prepare to design micro-hydro systems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 The extent and nature of the electrical installation is determined from design brief</p> <p>1.3 Safety and other regulatory requirements to which the electrical installation must comply are identified, obtained and understood</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others persons involved in the installation or associated work</p>
2 Develop micro-hydro systems design.	<p>2.1 Knowledge of micro-hydro systems performance standards, compliance methods is applied to the design</p> <p>2.2 Alternative arrangements for the hybrid power systems design are considered based on the requirements outlined in the design brief</p> <p>2.3 Safety, functional and budgetary considerations are incorporated in the design</p> <p>2.4 Micro-hydro system design draft is checked for compliance with the design brief and regulatory requirements</p> <p>2.5 Micro-hydro system design is documented for submission to appropriate persons for acceptance and approval</p> <p>2.6 Solutions to unplanned situation are provided consistent with organisation policy</p>
3 Obtain approval for micro-hydro systems design.	<p>3.1 Micro-hydro system design is presented and explained to client representative and/or other relevant persons</p> <p>3.2 Requests for alterations to the design are negotiated with relevant persons within the constraints of organisation policy</p> <p>3.3 Final design is documented and approval obtained from appropriate persons</p>

- 3.4 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and designing micro-hydro systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.1 Occupational Health and Safety principles
- 2.20.17.1 Micro-hydro systems installation and maintenance processes
- 2.20.17.2 Micro-hydro systems

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different micro-hydro systems and their installation.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Design micro-hydro systems as described in 7) and including:
  - A Developing outlines of alternative designs
  - B Developing the design within the safety and functional requirements and budget limitations
  - C Documenting and presenting design effectively
  - D Successfully negotiating design alteration requests
  - E Obtaining approval for final design
  - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing micro-hydro systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENED001A

Use basic computer applications

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: (See Note)	2

Note:  
Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEED001A Use basic computer applications'

**Skills Enabling Employment****8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEK039A Design stand-alone renewable energy systems

### Unit Descriptor

1)

This unit covers the design of stand-alone renewable energy systems and their installation. It encompasses following design briefs, incorporating schemes for protection of persons and property from dangers of system malfunction, ensuring other safety and performance standards and functional requirements are met and documenting design calculations and criteria.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK028A	Solve problems in stand-alone renewable energy systems
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### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher..

### License to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

### Competency Field

4)

Renewable and Sustainable Energy

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Prepare to design stand-alone renewable energy systems.	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood</p> <p>1.2 The extent and nature of the electrical installation is determined from design brief</p> <p>1.3 Safety and other regulatory requirements to which the electrical installation must comply are identified, obtained and understood</p> <p>1.4 Design development work is planned to meet scheduled timelines in consultation with others persons involved in the installation or associated work</p>
2 Develop stand-alone renewable energy systems design.	<p>2.1 Knowledge of stand-alone renewable energy systems performance standards, compliance methods is applied to the design</p> <p>2.2 Alternative arrangements for the hybrid power systems design are considered based on the requirements outlined in the design brief</p> <p>2.3 Safety, functional and budgetary considerations are incorporated in the design</p> <p>2.4 Stand-alone renewable energy system design draft is checked for compliance with the design brief and regulatory requirements</p> <p>2.5 Stand-alone renewable energy system design is documented for submission to appropriate persons for acceptance and approval</p> <p>2.6 Solutions to unplanned situation are provided consistent with organisation policy.</p>
3 Obtain approval for stand-alone renewable energy systems design.	<p>3.1 Stand-alone renewable energy system design is presented and explained to client representative and/or other relevant persons</p> <p>3.2 Requests for alterations to the design are negotiated with relevant persons within the constraints of organisation policy</p> <p>3.3 Final design is documented and approval obtained from appropriate persons</p>

- 3.4 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and designing stand-alone renewable energy systems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.18.1 Occupational Health and Safety principles

2.20.9.2 Stand-alone renewable energy system design consideration

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to designing at least two different stand-alone renewable energy systems and their installation with at least three energy sources.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:

- Design stand-alone renewable energy systems as described in 7) and including:
  - A Developing outlines of alternative designs
  - B Developing the design within the safety and functional requirements and budget limitations
  - C Documenting and presenting design effectively
  - D Successfully negotiating design alteration requests
  - E Obtaining approval for final design
  - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in designing stand-alone renewable energy systems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEE001A

Use basic computer applications

**Key competencies**
**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.3; 4.1; 4.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.2 to 3.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: (See Note)	2

Note:

Where dedicated application software is used in demonstrating competency this unit may be assessed concurrently with 'UEENEE001A Use basic computer applications'

**Skills Enabling 8.7)**

**Employment**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1; 4.3
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 3.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1; 1.2
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEEK040A **Develop engineering solutions to renewable energy problems**

### **Unit Descriptor**

1)

This unit covers developing engineering solutions to resolve problems with renewable energy. It encompasses working safely, applying extensive knowledge of renewable energy systems and components and their operating parameters, gathering and analysing data, applying problem solving techniques, developing and documenting alternatives solutions.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK031A	Design wind energy conversion systems rated to 10 kW
UEENEEK032A	Develop strategies to address sustainability issues
UEENEEK035A	Design grid connected power supply systems
UEENEEK038A	Design micro-hydro systems
UEENEEK039A	Design stand-alone renewable energy systems

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

**License to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

**Competency Field**

**4)**

Renewable and Sustainable Energy

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.

1 Prepare to develop engineering solution for renewable energy problems

- 1.1 OHS processes and procedures for a given work area are identified, obtained and understood
- 1.2 Established OHS risk control measures and procedures are followed in preparation for the work
- 1.3 The extent of the renewable energy problem is determined from performance specifications and situation reports and in consultation with relevant persons
- 1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work
- 1.5 Effective strategies are determined to ensure solution development and implementation is carried out efficiently

2 Develop engineering solution for renewable energy problems

- 2.1 OHS risk control measures and procedures are followed for carrying out the work
- 2.2 Knowledge of renewable energy systems and components, their construction, operation, characteristics and applications are applied to developing solutions to renewable energy problems
- 2.3 Parameters, specifications and performance requirements in relation to each renewable energy problem are set in accordance with established procedures
- 2.4 Approaches to resolving renewable energy problems are analysed to provide most effective solutions

	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy
	2.6	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards
3	Test, document and implement engineering solution for renewable energy problem	<p>3.1 Solutions to renewable energy problems are tested to determine their effectiveness and modified where necessary</p> <p>3.2 Adopted solutions are documented, including instructions for implementation that incorporates risk control measures to be followed</p> <p>3.3 Appropriately competent and qualified persons required to implement solutions to renewable energy problems are coordinated in accordance with regulatory requirements and enterprise policy (See Note)</p> <p>3.4 Justification for solutions used to solve renewable energy problems is documented for inclusion in work/project development records in accordance with professional standards</p>

Note

A licence or permit to practise in the workplace is required for specified work on building and premises

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and developing engineering solutions to renewable energy problems. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.17.18.1 Thermodynamics fundamentals
- 2.18.1 Occupational Health and Safety principles
- 2.20.21 Distributed generation

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to developing engineering solution for at least four renewable energy problems.

Note.

Typical renewable energy problems are those encountered in meeting performance requirements and

compliance standards, revising a system operating parameters and dealing with system malfunctions

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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**demonstrate  
competency in  
this unit**

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop engineering solutions to renewable energy problems as described in 7) and including:
    - A Understanding the extent of the renewable energy problem
    - B Forming effective strategies for solution development and implementation
    - C Obtaining renewable energy system/component parameters, specifications and performance requirements appropriate to each problem.
    - D Testing and solutions to renewable energy problems
    - E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
    - F Documenting justification of solutions implemented in accordance with professional standards
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing engineering solutions to renewable energy problems.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE001A and other discipline specific occupational health and safety unit(s) must be reassessed in relation to this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
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How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.2 to 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.3	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	3
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4; 1.5; 3.3	3
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4; 3.1	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2 to 2.4; 3.1	3

**Skills Enabling Employment**

**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  1.3 to 1.5; 3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.2 to 3.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## UEENEEK041A **Develop strategies for effective energy reduction in buildings**

### **Unit Descriptor**

1)

This unit covers evaluating energy used in buildings and developing and documenting strategies/methods to effectively reduce energy use without compromising occupancy standards. It encompasses working safely, setting up and conducting evaluation measurements and evaluating energy use from measured parameters.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK032A      Develop strategies to address sustainability issues

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

### **License to practise**

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

### **Competency Field**

4)

Renewable and Sustainable Energy

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance must be consistent with the evidence guide.
1 Prepare to develop strategies for effective energy reduction in buildings.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 Established OHS risk control measures and procedures are followed in preparation for the work</p> <p>1.3 The extent of evaluation is determined from specifications of building(s) and services, plant and machinery and discussed with appropriate personnel</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others</p> <p>1.5 Tools, testing devices, and materials needed to carry out the work are obtained and checked for correct operation and safety</p>
2 Develop strategies for effective energy reduction in buildings.	<p>2.1 OHS risk control measures and procedures for carrying out the work are followed</p> <p>2.2 Tests and measurements are carried out in strict accordance with OHS requirements safety procedures</p> <p>2.3 In-depth knowledge of the energy use of building services, plant and machinery is applied to the evaluation process</p> <p>2.4 Energy evaluation tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny</p> <p>2.5 Strategies to reduce energy use with compromising occupancy standards are developed from knowledge of energy management and evaluation test results.</p> <p>2.6 Unexpected situations are dealt with safely and with the approval of an authorised person</p> <p>2.7 Evaluation is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practices</p>
3 Document and report strategies for effective energy reduction in buildings	3.1 OHS work completion risk control measures and procedures are followed

- 3.2 Work site is cleaned and made safe in accordance with established procedures
- 3.3 Results of energy use evaluation and recommended strategies and their criterion for energy reduction are documented in accordance with established procedures
- 3.4 Energy reduction report is forwarded to appropriate persons

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and developing strategies for effective energy reduction in buildings. The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.16.13 Building management systems
- 2.18.1 Occupational Health and Safety principles
- 2.20.12 Energy efficient building design

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to developing strategies for effective energy reduction in at least two buildings each used for a different purpose.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence must also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Develop strategies for effective energy reduction in buildings as described in 7) and including:
    - A Determining the extent of the evaluation.
    - B Setting up and conducting appropriate examinations and tests.
    - C Reporting evaluation including recommendation for improving energy efficiency
    - D Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in developing strategies for effective energy reduction in buildings.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent**

**8.5)**

**assessment and relationship with other units**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 3.4	3
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1; 1.3; 1.4; 2.6	3
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.4	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	3
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.4; 2.5	2

**Skills Enabling 8.7)**

**Employment**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3; 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.3; 1.4; 2.5 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.7



**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 Part 2.1R  
R – Research units**

**Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008**

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## **UEENEER001A      Contribute to the planning of a research project**

### **Unit Descriptor**

**1)**

This unit covers the ability to gather background information relevant to a research project, understand the context of the research project and contribute to the development of a research plan to achieve quality outcomes.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5
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### **Application of the unit**

**3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

**4)**

Research

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Acquire and understand background information relevant to the Research project.	<p>1.1 Information sources about the research topic are identified and evaluated for reliability and validity.</p> <p>1.2 Information about the consumer, product, market and competition is collected, reviewed and understood.</p> <p>1.3 Key clients/stakeholders, their views and interests, are identified and recorded.</p> <p>1.4 The context (industrial, legal, ethical, political) of the research project is identified and understood.</p>
2 Understand the Logistics of a Research Project.	<p>2.1 Client, stakeholder and organisational requirements are identified and understood.</p> <p>2.2 Contractual obligations of the project are identified and understood.</p> <p>2.3 Resources available to support the project are identified and understood.</p> <p>2.4 Quality standards for the project are identified and understood.</p>
3 Contribute to the planning of a Research Project	<p>3.1 Project objectives, methodology and strategies appropriate to the requirements and contractual obligations of the project are identified and selected, in a team environment.</p> <p>3.2 Project phases, milestones, reporting and review points are identified, in a team environment.</p> <p>3.3 criteria for evaluating each project deliverable against pre-defined quality standards are developed, in a team environment.</p> <p>3.4 A Research Plan is developed, in a team environment.</p>
4 Seek endorsement and ensure distribution of a Research Project Plan	<p>4.1 The draft Research Plan is forwarded to clients/stakeholders/appropriate personnel for perusal and comment.</p>

- 4.2 The draft Research Plan is amended to incorporate recommended improvements from clients/stakeholders/appropriate personnel.
- 4.3 The final Research Plan is confirmed against overall project deliverables by appropriate personnel.
- 4.4 The final Research Plan is distributed to all appropriate personnel and team members.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contribute to the planning of a research project.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.16.1 Project planning
- 2.2.17 Project management
- 2.2.25 Research concepts
- 2.2.33 Work in a team
- 2.2.34 Scientific writing and communication
- 2.2.35 Data collection techniques
- 2.2.36 Data analysis and presentation
- 2.2.37 Product development and trials
- 2.2.38 Intellectual property concepts
- 2.2.39 Commercialisation concepts
- 2.18.1 Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the planning of research projects. Typically this work is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. It generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit – the learner’s performance outcome is reported in accordance with the preferred approach; where required by the regulated environment, this will be a percentile graded result
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Contribute to the planning of a research project as described in 7) and including:
    - A Demonstrating consistent performance for each Element of the unit
    - B Meeting the Performance Criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace
    - C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled ‘Essential knowledge and associated skills’.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in contributing to the planning of a research project.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- BSXFM1504A Participate in, lead and facilitate work teams
- UEENEER002A Contribute to the conduct of a research project
- UEENEER003A Contribute to the development of a product/application/service
- UEENEER004A Contribute to the trial of a product/application/service
- UEENEER005A Contribute to intellectual property management
- BSBCM306A Produce business documents
- BSBSBM405A Monitor and manage business operations
- UEENEER00A Contribute to the commercialisation of a product/application/service
- PMBQUAL309A Solve problems using 'quality tools'

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  All	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  3.1 to 4.4	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  3.1 to 4.2	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  4.1	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

### Skills Enabling Employment

#### 8.7)

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.4
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  All

**UEENEER001A – Contribute to the planning of a research project**

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 2.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  All

## **UEENEER002A Contribute to the conduct of a research project**

### **Unit Descriptor**

**1)**

This unit covers the ability to identify information sources and collect and analyse information in accordance with confirmed research project objectives and compile and present results in accordance with current business practices.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5
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### **Application of the unit**

**3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

**4)**

Research

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Confirm research parameters	<p>1.1 Consultation with appropriate personnel is undertaken to ensure that the scope, objectives and expected outcomes of the research are understood.</p> <p>1.2 Timeframes, available resources, budget and quality standards for the research are confirmed and understood.</p> <p>1.3 The research methodology and strategies are confirmed and understood.</p>
2 Identify sources and availability of information	<p>2.1 The type and range of information required is clearly identified to meet research objectives.</p> <p>2.2 Information sources are identified and evaluated for their contribution to the research.</p> <p>2.3 Protocols and other procedures required to access information are clearly identified and appropriate action taken.</p> <p>2.4 Limitations on the availability of material are identified and appropriate action taken.</p> <p>2.5 Obstacles to the collection of information are identified and appropriate action taken.</p>
3 Collect information to achieve research objectives	<p>3.1 Information collection methods are applied correctly and consistently, in accordance with appropriate procedures and agreements reached with information sources.</p> <p>3.2 The types and range of information collected are in line with the research objectives.</p> <p>3.3 Information is recorded accurately and clearly in an appropriate format.</p>
4 Analyse and compile research information	<p>4.1 Methods of analysis and compilation are appropriate to the information collected and objectives of the research.</p> <p>4.2 Methodologies and procedures incorporate current technological developments and meet relevant industry standards.</p>

- |   |   |   |  |
|---|---|---|--|
|   | 4.3                                       | Results are obtained within the specified time, budget and quality constraints. |  |
|   | 4.4                                       | Results are recorded accurately and clearly in appropriate format.              |  |
|   | 4.5                                       | Results are carefully interpreted and conclusions drawn.                        |  |
|   | 4.6                                       | The results and conclusions are reviewed with appropriate personnel.            |  |
| 5 | Present research results and conclusions. | 5.1   | A report/summary/presentation detailing the research results and conclusions is developed in accordance with current business practices. |
|   |   | 5.2   | Confidential information is protected in accordance with predefined agreements and/or procedures.  |
|   |   | 5.3   | All sources of information are accurately acknowledged or cited in a recognised and appropriate format.                                  |
|   |   | 5.4   | The success of the research methodology is evaluated against the research objectives.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the conduct of a research project.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |        |   |
|--------|---|
| 2.2.17 | Project management                        |
| 2.2.25 | Research concepts                         |
| 2.2.33 | Work in a team                            |
| 2.2.34 | Scientific writing and communication      |
| 2.2.35 | Data collection techniques                |
| 2.2.36 | Data analysis and presentation            |
| 2.2.37 | Product development and trials            |
| 2.2.38 | Intellectual property concepts            |
| 2.18.1 | Occupational Health and Safety principles |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the planning of research projects. Typically this work is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. It generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

## Overview of Assessment

### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

## Critical aspects of evidence required to demonstrate competency in this unit

### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement OHS workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Contribute to the conduct of a research project as described in 7) and including:
    - A Demonstrating consistent performance for each Element of the unit
    - B Meeting the Performance Criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace
    - C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled ‘Essential knowledge and associated skills’.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in contributing to the conduct of a research project.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods outlined in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- BSXFM1504A Participate in, lead and facilitate work teams
- UEENEER001A Contribute to the planning of a research project
- UEENEER003A Contribute to the development of a product/application/service
- UEENEER004A Contribute to the trial of a product/application/service
- UEENEER005A Contribute to intellectual property management
- BSBCM306A Produce business documents
- BSBSBM405A Monitor and manage business operations
- UEENEER006A Contribute to the commercialisation of a product/application/service
- PMBQUAL309A Solve problems using ‘quality tools’

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 5.1 to 5.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 4.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 2.1 to 2.5	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: N/A	
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.4 to 2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1 to 4.6
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3; 3.1 to 3.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 3.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  2.5

## **UEENEER003A Contribute to the development of a product/application/service**

### **Unit Descriptor**

**1)**

This unit covers the ability to assist managers to plan, coordinate and report on the development of a product/application/service.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

**4)**

Research

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Contribute to the development of a design brief for a product/service/application.	<p>1.1 Technical specifications, regulatory, industrial, intellectual property and market requirements of the product/application/service to be developed are negotiated with client(s), stakeholders and management and agreed on.</p> <p>1.2 Technical specifications, regulatory, industrial, intellectual property and market requirements of the product/application/service to be developed are confirmed.</p> <p>1.3 Resource requirements, including personnel, equipment and materials needed to develop the product/application/service area confirmed.</p> <p>1.4 Quality requirements and standards for development of the product/application/service are confirmed.</p> <p>1.5 A design brief for the product/application/service is developed in a team environment.</p> <p>1.6 Approval is obtained for the design brief from appropriate personnel.</p>
2 Prepare to develop a product/application/service	<p>2.1 The required outcome(s) as identified in design brief is confirmed with appropriate personnel.</p> <p>2.2 The product/application/service is developed in consultation with appropriate production personnel.</p> <p>2.3 A development procedure is formulated to:                      - deliver required quality outcome(s)                      - ensure OHS, environmental, industrial and regulatory requirements are stringently observed                      - ensure tooling, process, materials and equipment specifications are addressed</p> <p>2.4 Approval is obtained of the development procedure from appropriate personnel.</p>
3 Contribute to the development of a	3.1 The development procedure is confirmed with appropriate personnel.

product/application/service	3.2	A product/application/ service product is developed in accordance with the design brief and development procedure.
	3.3	Development results are recorded in accordance with enterprise procedures.
	3.4	Development results and identify characteristics which are outside design and development specifications are identified.
	3.5	Changes are recommended, as necessary, to achieve product/application/ service quality and production requirements.
	3.6	Approval of changes is obtained from appropriate personnel.
	3.7	Revision of the product/ application/service to achieve quality and production requirements is coordinated where necessary.
	4 Document and report product/application/service development outcomes	4.1
4.2		Product/application/service development reporting requirements are completed.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the development of a product/application/service.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.2.17 Project management
- 2.2.25 Research concepts
- 2.2.33 Work in a team
- 2.2.34 Scientific writing and communication
- 2.2.35 Data collection techniques
- 2.2.36 Data analysis and presentation
- 2.2.37 Product development and trials
- 2.2.38 Intellectual property concepts

## 2.18.1 Occupational Health and Safety principles

**RANGE STATEMENT**

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the development of a product/application/service.

Product/application/service design and development briefs may be provided by external and/or internal clients.

Typically the work covered by this unit is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the product/application/service being developed.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Resources, which may be subject to negotiation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Contribute to the development of a product/application/service as described in 7) and including:
    - A Demonstrating consistent performance for each Element of the unit
    - B Meeting the Performance Criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace
    - C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in contributing to the development of a product/application/service.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A	Participate in, lead and facilitate work teams
UEENEER001A	Contribute to the planning of a research project
UEENEER002A	Conduct to the conduct of a research project
UEENEER004A	Contribute to the trial of a product/application/service
UEENEER005A	Contribute to intellectual property management
BSBCM306A	Produce business documents
BSBSBM405A	Monitor and manage business operations

UEENEER006A Contribute to the commercialisation of a product/application/service

PMBQUAL309A Solve problems using ‘quality tools’

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.7	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.7	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 2.4	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 2.2; 3.1 to 3.2; 3.6	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.3 to 4.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 2.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## UEENEER004A Contribute to the trial of a product/application/service

### Unit Descriptor

1)

This unit covers the ability to assist the manager’s plan, coordinate and report on a product/application/service trial.

### Prerequisite Unit(s)

2)

### Competencies

2.1)

There are no prerequisite competencies for this unit.

### Literacy and numeracy skills

2.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’.

Reading	5	Writing	5	Numeracy	5
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### Application of the Unit

3)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### Licence to practise

3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### Competency Field

4)

Research

### ELEMENT

### PERFORMANCE CRITERIA

5) Elements describe the essential outcomes of a unit

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Acquire and understand background

1.1 Information sources about the research topic are identified and evaluated for reliability and validity.

information relevant to the trial of the product/application/service.	1.2	Information about the consumer, product, market and competition is collected, reviewed and understood.
	1.3	Key clients/stakeholders and their particular views and interests are identified and recorded.
	1.4	The context (industrial, legal, ethical, political etc) of the research project is identified and understood.
2 Understand the logistics of a trial of a product, application and/or service	2.1	Client, stakeholder and organisational requirements are identified and understood.
	2.2	Contractual obligations of the project are identified and understood.
	2.3	Resources available to support the project are identified and understood.
	2.4	Quality standards for the project are identified and understood.
3 Contribute to the trial of a product, application and/or service	3.1	Project objectives, methodology and strategies appropriate to the requirements and contractual obligations of the project are identified and selected in a team environment.
	3.2	Project phases, milestones, reporting and review points are identified in a team environment.
	3.3	Criteria for evaluating each project deliverable against predefined quality standards are developed in a team environment.
	3.4	A Research Plan is developed in a team environment.
4 Seek endorsement and ensure distribution of a trial of a product, application and/or service	4.1	The draft Research Plan is forwarded to clients/stakeholders/ appropriate personnel for perusal and comment.
	4.2	The draft Research Plan is amended to incorporate recommended improvements from clients/stakeholders/appropriate personnel
	4.3	The final Research Plan is confirmed against overall project deliverables by appropriate personnel.
	4.4	The final Research Plan is distributed to all appropriate personnel and team members.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the trial of a product/application/service.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.17	Project management
2.2.25	Research concepts
2.2.33	Work in a team
2.2.34	Scientific writing and communication
2.2.35	Data collection techniques
2.2.36	Data analysis and presentation
2.2.37	Product development and trials
2.2.38	Intellectual property concepts
2.18.1	Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the trial and, where necessary, retrial of products, applications and/or services to meet the requirements of a development brief.

Product/application/service design and development briefs may be provided by external and/or internal clients.

Typically the work covered by this unit is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the product/application/service being developed.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain those sections of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the

tasks undertaken in trailing products/applications/services. They should be aware of enterprise business goals and the impact of trials on these goals.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Resources, which may be subject to negotiation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity,

electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Contribute to the trial of a product/application/service as described in 7) and including:
    - A Demonstrating consistent performance for each Element of the unit

- B Meeting the Performance Criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace
- C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled ‘Essential knowledge and associated skills’.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in contributing to the trial of a product/application/service.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- BSXFM1504A Participate in, lead and facilitate work teams
- UEENEER001A Contribute to the planning of a research project
- UEENEER002A Conduct to the conduct of a research project

- UEENEER004A Contribute to the trial of a product/application/service
- UEENEER005A Contribute to intellectual property management
- BSBCM306A Produce business documents
- BSBSBM405A Monitor and manage business operations
- UEENEER006A Contribute to the commercialisation of a product/application/service
- PMBQUAL309A Solve problems using ‘quality tools’

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  2.1 to 3.2	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 2.7	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 2.7	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  2.1 to 2.2; 2.6 to 2.7	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  2.4 to 2.5; 3.1 to 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.7
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 2.7
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEER005A Contribute to Intellectual Property management**

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers the ability to assist in the planning, management and protection of an organisation’s Intellectual Property.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  There are no prerequisite competencies for this unit.
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’.  Reading      5      Writing      5      Numeracy      5
<b>Application of the Unit</b>	<b>3)</b>  This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.
<b>Competency Field</b>	<b>4)</b>  Research

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Plan for the management of intellectual property within the organisation	<p>1.1 The types of Intellectual Property residing within the organization are identified.</p> <p>1.2 Sections of the organisation in which Intellectual Property management is required are identified.</p> <p>1.3 Intellectual Property rights appropriate to the types of Intellectual Property within the organization are identified.</p> <p>1.4 Intellectual Property rights of other like organizations are identified.</p> <p>1.5 An organisational Intellectual Property Management Plan, consistent with the organisation’s Business Plan, is developed/amended.</p> <p>1.6 Approval of the new/amended Intellectual Property Management Plan is sought from relevant personnel.</p>
2 Contribute to the management of intellectual property within the organisation	<p>2.1 A new/amended Intellectual Property Management Plan within the organization is implemented.</p> <p>2.2 Documentation, deeds, registration certificates etc related to the organisation’s Intellectual Property assets are managed.</p> <p>2.3 Intellectual Property management systems and structures, eg registrations, are monitored to ensure they are valid and working correctly.</p> <p>2.4 Evidence supporting the organisation’s entitlement to exercise its Intellectual Property rights is collected, stored and maintained.</p>
3 Contribute to protection of the organisation’s Intellectual Property.	<p>3.1 Sources of assistance in regard to the protection of the organisation’s Intellectual Property are identified.</p> <p>3.2 Networks and professional relationships beneficial to the protection of the organisation’s Intellectual Property are established and maintained.</p>

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to Intellectual Property Management.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.17	Project management
2.2.33	Work in a team
2.2.38	Intellectual property concepts
2.18.1	Occupational Health and Safety principles

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the planning and conduct of research and/or development and/or trialling of products, applications and/or services and require knowledge and skills in Intellectual Property management in order complete these roles efficiently and effectively.

Typically the work covered by this unit is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the product/application/service being researched, developed, trialled and/or commercialised.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain those sections of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the research, development and, where appropriate, commercialisation of a product/application/service.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Contribute to Intellectual Property Management as described in 7) and including:
    - A Demonstrating consistent performance for each Element of the unit
    - B Meeting the Performance Criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace
    - C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled ‘Essential knowledge and associated skills’.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and  
specific  
resources for  
assessment**
**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.

This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in contributing to Intellectual Property Management.

### **Method of assessment**

#### **8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

### **Concurrent assessment and relationship with other units**

#### **8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A	Participate in, lead and facilitate work teams
UEENEER001A	Contribute to the planning of a research project
UEENEER002A	Conduct to the conduct of a research project
UEENEER003A	Contribute to the development of a product/application/service
UEENEER004A	Contribute to the trial of a product/application/service
BSBCM306A	Produce business documents
BSBSBM405A	Monitor and manage business operations
UEENEER006A	Contribute to the commercialisation of a product/application/service
PMBQUAL309A	Solve problems using ‘quality tools’

**Key competencies****8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1 to 2.4	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	2
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.5 to 2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: N/A	

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  3.1 to 3.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 2.4
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEER006      Contribute to the commercialisation of products/applications/services**

### **Unit Descriptor**

**1)**

This unit covers the ability to assist managers identify and investigate opportunities for commercialisation within the organisation, commercialise a product, application or service and critically assess the commercialisation process.

### **Prerequisite Unit(s)**

**2)**

### **Competencies**

**2.1)**

There are no prerequisite competencies for this unit.

### **Literacy and numeracy skills**

**2.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5
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### **Application of the Unit**

**3)**

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

### **Licence to practise**

**3.1)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships.

### **Competency Field**

**4)**

Research

ELEMENT	PERFORMANCE CRITERIA
5) Elements describe the essential outcomes of a unit	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Contribute to the identification and investigation of commercialisation opportunities.	<p>1.1 Commercialisation opportunities are identified and analysed in terms of their likely fit with the organisation’s goals.</p> <p>1.2 Each opportunity is evaluated to determine its impact on current business and customer base.</p> <p>1.3 An assessment of external factors, costs, benefits, risks, market opportunities and potential competitors is undertaken to determine the potential viability of each opportunity.</p> <p>1.4 Probable return on investment is determined.</p> <p>1.5 A design brief for the product/application/service is developed in a team environment.</p> <p>1.6 Approval for the design brief is obtained from appropriate personnel.</p>
2 Prepare to develop a product/ application/service	<p>2.1 Required outcome(s), as identified in design brief, with appropriate personnel are confirmed.</p> <p>2.2 Product/application/service is developed in consultation with appropriate production personnel.</p> <p>2.3 A development procedure is formulated to: <ul style="list-style-type: none"> <li>- deliver required quality outcome(s)</li> <li>- ensure OHS, environmental, industrial and regulatory requirements are stringently observed</li> <li>- ensure tooling, process, materials and equipment specifications are addressed.</li> </ul> </p> <p>2.4 Approval of the development procedure is obtained from appropriate personnel.</p>
3 Contribute to the development of a product, application and/or service.	<p>3.1 The development procedure is confirmed with appropriate personnel.</p> <p>3.2 Assist in coordinating the development of a product/application/ service product, in accordance with the design brief and development procedure.</p> <p>3.3 Development results in accordance with enterprise procedures are recorded.</p>

	3.4	Development results and characteristics which are outside design and development specifications are analysed and identified.
	3.5	Changes are recommended, as necessary, to achieve product/application/ service quality and production requirements.
	3.6	Approval of changes is obtained from appropriate personnel.
	3.7	The product/ application/service is revised, where necessary, to achieve quality and production requirements.
4	Document and report product, application and/or service development outcomes.	4.1 All product/application/service development objectives are met.
		4.2 Product/application/service development reporting requirements are completed.

### REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the commercialisation of products/applications/ services.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

2.2.33	Work in a team
2.2.38	Intellectual property concepts
2.2.39	Commercialisation concepts
2.18.1	Occupational Health and Safety principles

### RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the development and where necessary, redevelopment of products, applications and/or services to meet the requirements of design and development briefs.

Product/application/service design and development briefs may be provided by external and/or internal clients.

Typically the work covered by this unit is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team which may or may not include a research component. This generally

involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the product/application/service being developed.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain those sections of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the tasks undertaken in developing products/applications/services. They should also be aware of enterprise business goals and the impact of their projects on these goals.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Resources, which may be subject to negotiation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in

a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Contribute to the commercialisation of products/applications/ services as described in 7) and including:
    - A Demonstrating consistent performance for each Element of the unit
    - B Meeting the Performance Criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace
    - C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled ‘Essential knowledge and associated skills’.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in contributing to the commercialisation of products/applications/ services.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

- BSXFM1504A Participate in, lead and facilitate work teams
- UEENEER001A Contribute to the planning of a research project
- UEENEER002A Conduct to the conduct of a research project
- UEENEER003A Contribute to the development of a product/application/service
- UEENEER004A Contribute to the trial of a product/application/service
- UEENEER005A Contribute to Intellectual Property management
- BSBCM306A Produce business documents
- BSBSBM405A Monitor and manage business operations
- PMBQUAL309A Solve problems using ‘quality tools’

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.7	2
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 3.7	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 2.1 to 3.7	2

How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.5 to 2.2; 2.4	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  N/A	

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1 to 4.2
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 3.7

5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A



**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.1P  
P – Restrictions and Specialisations**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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# UEENEEP001A Disconnect and reconnect fixed wired electrical equipment connected to a Low Voltage supply

**Unit Descriptor** 1)

This unit covers disconnecting and reconnecting fixed wired electrical equipment. This may be incidental to or a primary and regular function of work related to a principle work function. It encompasses working safely, identifying supply arrangements, following isolation procedures, selecting and using testing and measuring devices, terminating and connecting cables and conductors, safely testing and reporting and excludes disconnecting or reconnecting circuits at a switchboard or to general electrical accessories (including switches, socket outlets, circuit protective devices etc); or installation of or alteration to any part of the fixed electrical wiring system (defined as electrical installing work).

**Prerequisite Unit(s)** 2)

**Competencies** 2.1)

Competency in the units is to be determined only after competency has been achieved in a relevant field to which the electrical work is incidental or a primary and regular ancillary function of the work to the primary work function, unless otherwise specified in a regulated Vocational Training Order/Agreement/Program. Such requirement is expected to include a broad application of skills and knowledge related to occupational health and safety in the selection, and knowledge, and use of, general hand and power tools relative to hot waters servicing, pool servicing, mechanical maintenance, appliance servicing, emergency services and equipment repair. For a summary of the prerequisite requirement refer to Part 1 - Competency Standards of this Resource Pack, Appendix A – Table A.1 Summary of Prerequisite Units and Competencies.

**Literacy and numeracy skills** 2.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

**Application of the Unit 3)**

This unit applies to any formal recognition for this standard at the aligned AQF 2/3 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit requires a licence to practise in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Restricted and Specialisations

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to disconnect electrical equipment.

- 1.1 Disconnection is planned to ensure OHS policies and procedures are followed.
- 1.2 Appropriate persons are consulted to ensure work is coordinated effectively with others involved in the work site.
- 1.3 Safety hazards which have not previously been electrical characteristics of electrical equipment and electrical supply are determined and recorded in accordance with established procedures.
- 1.4 The point of isolation of electrical equipment to be disconnected is determined.
- 1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.

- |   |  |     |  |
|---|--|-----|--|
| 2 | Disconnect electrical equipment.           | 2.1 | OHS policies and procedures are followed.  |
|   |  | 2.2 | Electrical equipment is isolated in accordance with AS/NZS 4836:2001 and established procedures (see Range Statement).   |
|   |  | 2.3 | Conductor connection sequence is recorded and labelled in accordance with established procedures.  |
|   |  | 2.4 | Electrical equipment is disconnected from fixed wiring without damage to other components.   |
|   |  | 2.5 | Disconnected conductors/cables are terminated in accordance with requirements to ensure they are safe and present no potential hazard.                                 |
| 3 | Prepare to reconnect electrical equipment. | 3.1 | Reconnection is planned to ensure OHS policies and procedures are followed.  |
|   |  | 3.2 | Appropriate personnel are consulted to ensure work is coordinated effectively with others involved in the work site.   |
|   |  | 3.3 | The point of isolation of the circuit to which the electrical equipment is to be connected is determined.  |
|   |  | 3.4 | Replacement electrical equipment is selected on the basis of rating and characteristics being the same as that of the original electrical equipment.                   |
|   |  | 3.5 | Appropriate personnel are consulted in the event that replacement electrical equipment is not available.   |
|   |  | 3.6 | Original and/or replacement electrical equipment is tested to ensure it is safe to connect to the electrical supply and use.   |
|   |  | 3.7 | Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety. |
| 4 | Reconnect electrical equipment.            | 4.1 | OHS policies and procedures are followed.  |
|   |  | 4.2 | Measures are taken to ensure circuit to which electrical equipment is to be connected remains isolated in accordance with AS/NZS 4836:2001.                            |
|   |  | 4.3 | The continuity of the protective earthing conductor is tested to determine whether it is sufficiently low.   |

- |   |   |   |
|---|---|---|
|   | 4.4   | The resistance between the protective earthing conductor and the neutral conductor is tested to determine whether it is sufficiently low, ie not greater than 2W. |
|   | 4.5   | The insulation resistance of active conductors is tested to confirm that it is greater than 1M W.   |
|   | 4.6   | An appropriate qualified person is engaged to rectify any non-compliance condition revealed by the testing under item 4.3 to 4.5.                                 |
|   | 4.7   | Continuity between exposed conductive parts of the equipment and the main earth or metal switchboard enclosure is confirmed.                                      |
|   | 4.8   | Electrical equipment is connected to comply with requirements.  |
|   | 4.9   | Connections to the equipment are checked to confirm they are correct.   |
| 5 | Test the reconnected electrical equipment for safe operation. | 5.1 OHS policies and procedures, and established procedures for the reinstatement of isolated circuits and electrical equipment are followed.                     |
|   |   | 5.2 Arrangements are made with appropriate personnel to test the operation of the electrical equipment.   |
|   |   | 5.3 Operational non-conformances are identified and reported in accordance with established procedures.   |
| 6 | Provide status report(s).                                     | 6.1 Status report(s) are completed and notified in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and disconnecting and reconnecting fixed wired electrical equipment connected to a Low Voltage supply.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 – Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.1.5.1 | Power cable and conductor terminations    |
| 2.2.2   | Enterprise reporting and recording system |
| 2.5.1.2 | Drawings and diagrams                     |
| 2.8.1.1 | Basic electrical principles               |

- 2.8.8 Electrotechnology science and materials
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.19.29 Disconnect/Reconnect
- 2.19.39 Produce Status Reports using established procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Competency shall be demonstrated in relation to disconnecting and reconnecting at least one of the following endorsed types of electrical equipment connected to supplies up to 1,000V a.c or 1,500V d.c:

- Pre-assembled types 1 and 2 cold cathode neon signs (N)
- Composite equipment incorporating one or more current-using devices and/or controls (P)

Note: Examples of composite equipment are a self-contained refrigeration unit, machine tools, and modular telephone booths.

- Control devices (Q)
- Electrical water heaters (R)
- Motors (S)

Note:

1. Each endorsement achieved is to be reported separately.
2. Limitations of this unit. This unit does not cover the knowledge and skills necessary for work:
  - a. where high fault currents are possible
  - b. on complex electrical apparatus and circuits
  - c. associated with fixed wiring other than disconnecting and reconnecting electrical equipment as listed in the Range Statement, including locating and rectifying faults of circuits at a switchboard or to general electrical accessories (including switches, socket outlets, circuit protective devices); or installation of or alteration to any part of the fixed electrical wiring system (defined as electrical installing work),
  - d. on luminaires,
  - e. in hazardous areas or on electrical equipment that is part of an explosion-protection technique.
3. Safe Working. Safe procedures for working within in the scope of this unit shall be in accordance with AS/NZS 4836:2001 'Safe working on low-voltage electrical installations.'

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

---

**competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Disconnect and reconnect fixed wired electrical equipment connected to a Low Voltage supply as described in 7) for each endorsement and including:
    - A OHS practice
    - B Determining electrical characteristics of equipment
    - C Selecting tools, equipment, and testing devices
    - D Identifying point of installation
    - E Identifying and isolating circuit (including testing for safe isolation)
    - F Preparing to disconnect electrical equipment
    - G Disconnecting of electrical equipment
    - H Preparing to reconnect electrical equipment
    - I Reconnection of electrical equipment
    - J Testing of the reconnected electrical equipment for safe operation including polarity and earth continuity

- K Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in disconnecting and reconnecting fixed wired electrical equipment connected to a Low Voltage supply.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 3.5; 5.3; 6.1	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 3.4; 4.2; 4.4; 4.5	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.5; 4.3	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2; 4.2 to 4.7	2

### **Skills Enabling Employment**

#### **8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  6.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  5.2 to 6.1
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5; 5.2

## **UEENEEP002A      Attach cords and plugs to electrical equipment for connection to a single phase 250 Volt supply**

<b>Unit Descriptor</b>	<b>1)</b>  This unit covers attaching flexible cords and plugs to electrical equipment for connection to supplies up to 250V a.c. This may be incidental to or a primary and regular function of work related to a principle function in the workplace. It encompasses working safely, identifying plug configurations, selecting and using testing and measuring devices, terminating and connecting cords/plugs and conductors, safety testing and reporting.
<b>Prerequisite Unit(s)</b>	<b>2)</b>
<b>Competencies</b>	<b>2.1)</b>  There are no prerequisite competencies for this unit
<b>Literacy and numeracy skills</b>	<b>2.2)</b>  Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’  Reading      3      Writing      3      Numeracy      3
<b>Application of the Unit</b>	<b>3)</b>  This unit applies to any formal recognition for this standard at the aligned AQF 2 level or higher.
<b>Licence to practise</b>	<b>3.1)</b>  The skills and knowledge described in this unit may require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.
<b>Competency Field</b>	<b>4)</b>  Restricted and Specialisations

ELEMENT	PERFORMANCE CRITERIA
<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Plan and prepare to attach flexible cord(s) and plug(s).</p>	<p>1.1 Work is planned and prepared to ensure OHS policies and procedures are followed, and the work is appropriately sequenced in accordance with requirements.</p> <p>1.2 Condition and ratings under which the flexible cords and plugs are to operate is determined from requirements and in consultation with appropriate personnel followed by written instruction.</p> <p>1.3 Flexible cords and plugs are selected to comply with standards and requirements for the condition and rating to be determined.</p> <p>1.4 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements.</p> <p>1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.</p> <p>1.6 Flexible cord(s) is prepared without damage to insulation and conductors and in accordance with requirements.</p>
<p>2 Attach flexible cord(s) and plug(s).</p>	<p>2.1 OHS policies and procedures are followed.</p> <p>2.2 Single insulated metal framed equipment is earthed in accordance with requirements.</p> <p>2.3 The integrity of double insulated equipment is maintained in accordance with requirements.</p> <p>2.4 Conductors are connected to terminals in accordance with requirements to ensure the required polarity is affected.</p>
<p>3 Test equipment for operation and safety.</p>	<p>3.1 Appropriate tests of the cord(s) and plug(s) connected to the electrical equipment are conducted in accordance with requirements and to established procedures to ensure safe installation and operation.</p>

- |   |  |  |
|---|--|--|
|   | 3.2  | Ongoing checks of the quality of work are undertaken in accordance with established procedures.  |
| 4 | Locate and repair fault(s) in attached flexible cord(s) and plug(s). | <p>4.1 Electrical equipment and attached flexible cord(s) and plug(s) are isolated, where necessary, in accordance with prescribed procedures.</p> <p>4.2 Other OHS policies and procedures are followed.</p> <p>4.3 Visual checks of the attached flexible cord(s) and plug(s) are carried out in accordance with prescribed procedures to detect any abnormal or obvious damage or fault.</p> <p>4.4 Fault(s) in attached flexible cord(s) and plug(s) are confirmed and components to be replaced are determined and details recorded in accordance with prescribed procedures.</p> <p>4.5 Fault(s) in attached flexible cord(s) and plug(s) are repaired in accordance with prescribed procedures, where necessary.</p> <p>4.6 Approval is obtained in accordance with prescribed procedures from appropriate personnel, before any contingencies are implemented.</p> |
| 5 | Provide status report(s).  | 5.1 Status report(s) are completed and notified in accordance with established procedures.   |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and attaching cords and plugs to electrical equipment for connection to a single phase 250 Volt supply.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.8.1.1 | Basic electrical principles                         |
| 2.18.1  | Occupational Health and Safety principles           |
| 2.18.2  | Electrical Safe working practices                   |
| 2.19.30 | Flexible cords and plugs to 250V                    |
| 2.19.6  | Fault find to 250 V — General appliances            |
| 2.19.39 | Produce Status Reports using established procedures |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any cord and plug connected equipment or cord extension leads intended for single-phase supplies up to 250v.

Note: *Limitations of this unit.* This unit does not cover the knowledge and skills necessary for work:

- a) Competencies associated with high current faults
- b) On complex electrical apparatus, circuits and electrical work
- c) In hazardous areas or on electrical equipment that is part of and explosion protection technique
- d) Nor competencies associated with fixed wiring.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions

about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points should be considered when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement OHS workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Attach cords and plugs to electrical equipment for connection to a single phase 250 Volt supply as described in 7) and including:
    - A Demonstrating consistent performance for each element of the unit
    - B Meeting the Performance Criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace
    - C Demonstrating an understanding of the underpinning knowledge and skills shown in the Essential

Knowledge and Associated Skills section of the unit

- D Planing and preparing to attach flexible cord(s) and plug(s) up to 250 V a.c
- E Attaching, replacing and repairing flexible cord(s) and plugs(s) up to 250 V a.c
- F Testing flexible cord(s), plugs(s) and connected equipment for operation and safety up to 250 V a.c., including polarity and continuity testing
- G Finding and repairing fault(s) in attached flexible cord(s) and plug(s)
- H Providing status report(s)
- J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in attaching cords and plugs to electrical equipment for connection to a single phase 250 Volt supply.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  N/A	
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.2	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.2; 4.1	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  2.3	1
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  N/A	
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.3; 2.4	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  2.1 to 2.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.6
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEP003A      Attach cords and plugs to electrical equipment for connection to 1000 Va.c. or 1500 Vd.c. supply**

### **Unit Descriptor**

1)

This unit covers attaching flexible cords/cables and plugs to electrical equipment connected to a supply up to 1,000V a.c. or 1,500V d.c. This may be incidental to or a primary and regular function of work related to a principle function in the workplace. It encompasses working safely, identifying plug configurations, selecting and using testing and measuring devices, terminating and connecting flexible cords/plugs and conductors, safety testing and reporting.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEP002A      Attach cords and plugs to electrical equipment for connection to a single phase 250 Volt supply

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit applies to any formal recognition for this standard at the aligned AQF 2 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Restricted and Specialisations

**ELEMENT PERFORMANCE CRITERIA**

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Plan and prepare to attach flexible cord/cables(s) and plug(s).</p>	<p>1.1 Work is planned and prepared to ensure OHS policies and procedures are followed, and the work is appropriately sequenced in accordance with requirements.</p> <p>1.2 Condition and ratings under which the flexible cord/cable(s) and plug(s) are to operate is determined from requirements and in consultation with appropriate personnel followed by written instruction.</p> <p>1.3 Flexible cord/cable(s) and plug(s) are selected to comply with standards and requirements for the condition and rating to be determined.</p> <p>1.4 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements.</p> <p>1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.</p> <p>1.6 Flexible cord/cable(s) is prepared without damage to insulation and conductors and in accordance with requirements.</p>
<p>2 Attach flexible cord(s)/cable(s) and plug(s).</p>	<p>2.1 OHS policies and procedures are followed.</p> <p>2.2 Single insulated metal framed equipment is earthed in accordance with requirements.</p> <p>2.3 The integrity of double insulated equipment is maintained in accordance with requirements.</p> <p>2.4 Conductors are connected to terminals in accordance with requirements to ensure the required polarity is affected.</p>

- |   |  |     |   |
|---|--|-----|---|
| 3 | Test equipment for operation and safety.                             | 3.1 | Appropriate tests of the cord/cable(s) and plug(s) connected to the electrical equipment are conducted in accordance with requirements and to established procedures to ensure safe installation and operation. |
|   |  | 3.2 | Ongoing checks of the quality of work are undertaken in accordance with established procedures.   |
| 4 | Locate and repair fault(s) in attached flexible cord(s) and plug(s). | 4.1 | Electrical equipment and attached flexible cord(s) and plug(s) are isolated, where necessary, in accordance with prescribed procedures.   |
|   |  | 4.2 | Other OHS policies and procedures are followed.   |
|   |  | 4.3 | Visual checks of the attached flexible cord(s) and plug(s) are carried out in accordance with prescribed procedures to detect any abnormal or obvious damage or fault.  |
|   |  | 4.4 | Fault(s) in attached flexible cord(s) and plug(s) are confirmed and components to be replaced are determined and details recorded in accordance with prescribed procedures.                                     |
|   |  | 4.5 | Fault(s) in attached flexible cord(s) and plug(s) are repaired in accordance with prescribed procedures, where necessary.   |
|   |  | 4.6 | Approval is obtained in accordance with prescribed procedures from appropriate personnel, before any contingencies are implemented.   |
| 5 | Provide status report(s).  | 5.1 | Status report(s) are completed and notified in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and attaching cords and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c. supply.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.19.31 Flexible cords/cables and plugs to 1000V
- 2.19.39 Produce Status Reports using established procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall/may be demonstrated in relation to any cord/cable and plug connected equipment or cord/cable extension leads intended for multi phase supplies up to 1,000V a.c. to 1,500V d.c.

Note:

Limitations of this unit. This unit does not cover the knowledge and skills necessary for work:

- a) Competencies associated with high current faults
- b) On complex electrical apparatus, circuits and electrical work
- c) In hazardous areas or on electrical equipment that is part of and explosion protection technique
- d) Nor competencies associated with fixed wiring.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Attach cords and plugs to electrical equipment for connection to 1000 Va.c. or 1500 Vd.c. supply as described in 7) and including:
    - A Demonstrating consistent performance for each element of the unit
    - B Meeting the Performance Criteria associated with each element of competence by employing the techniques, procedures, information and resources

available in the workplace

- C Demonstrating an understanding of the underpinning knowledge and skills shown in the Essential Knowledge and Associated Skills section of the unit
- D Planning and preparing to attach flexible cords/cables and plugs up to 1,000V a.c. to 1,500V d.c.
- E Attaching, replacing and repairing flexible cords/cables and plugs up to 1,000V a.c. to 1,500V d.c
- F Testing flexible cords/cables, plugs and equipment for operation and safety up to 1,000V a.c. to 1,500V d.c
- G Attaching, replacing and repairing flexible cords/cables, plugs and equipment for operation and safety up to 1,000V a.c. to 1,500V d.c
- H Providing status report(s)
- J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in attaching cords and plugs to electrical equipment for connection to 1000 Va.c. or 1500 Vd.c. supply.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3

‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEP002A     Attach cords and plugs to electrical equipment for connection to a single phase 250 Volt supply

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.6	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 1.2	2

How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.1	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application: All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application: All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 4.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: N/A



## **UEENEEP004A      Disconnect and reconnect explosion-protected electrical equipment connected to Low Voltage supply**

### **Unit Descriptor**

1)

This unit covers isolating, disconnecting and reconnecting flame proof, increased safety and intrinsic safety electrical equipment to supply up to 1,000V a.c. or 1,500V d.c. under restrictions of designated electrical equipment and conditions specified. It encompasses working safely in hazardous area, identifying supply arrangements, following isolation procedures, handling explosion-protection equipment, selecting and using testing and measuring devices, terminating and connecting cables and conductors, safety testing and reporting.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEP001A      Disconnect and reconnect fixed wired electrical equipment connected to a Low Voltage supply

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit applies to any formal recognition for this standard at the aligned AQF 3 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

**Competency Field**

4)

Restricted and Specialisations

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare for disconnection or reconnection.

1.1 Electrical equipment to be disconnected or reconnected is identified and purpose of the work to be carried out is verified with the authorised personnel.

1.2 Occupational health and safety and other statutory requirements and established procedures are followed.

1.3 Work clearances are obtained, isolation procedures followed and the work area is proven safe.

2 Disconnect electrical equipment.

2.1 Electrical characteristics and explosion protection specifications are identified.

2.2 Electrical equipment is dismantled to the extent necessary for disconnection and without unnecessary damage.

2.3 Electrical equipment components are stored appropriately to protect them against damage.

2.4 Cables are identified and marked and connection sequence recorded.

2.5 Cables are disconnected without unnecessary damage to terminals or components.

2.6 Electrical equipment is inspected for damage to the explosion protection components and conclusions verified with authorised personnel.

2.7 Any repairs required to explosion protection are carried out in accordance with established procedures and requirements.

3 Reconnect electrical equipment.

3.1 Cables are connected without damage to terminals or components.

3.2 Connections are checked and tested to confirm correct polarity and continuity.

- |   |   |   |  |
|---|---|---|--|
|   | 3.3                                       | Electrical equipment is assembled to comply with the relevant Standards for the given explosion protection technique. |  |
|   | 3.4                                       | Electrical equipment is tested for safety and correct operation.  |  |
| 4 | Prepare electrical equipment for service. | 4.1   | Isolation devices are removed and work clearance is released in accordance with established procedures.                      |
|   |   | 4.2   | Documentation is completed in accordance with established procedures.  |
|   |   | 4.3   | Operational personnel are notified when electrical equipment is ready for service in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and disconnecting and reconnecting explosion-protected electrical equipment connected to Low Voltage supply.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.18.1  | Occupational Health and Safety principles           |
| 2.18.6  | Hazardous area safe working practices               |
| 2.19.1  | Hazardous area and explosion protection principles  |
| 2.19.2  | Explosion-Protected equipment                       |
| 2.19.11 | Hazardous areas cable termination techniques        |
| 2.19.39 | Produce Status Reports using established procedures |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to disconnecting and reconnecting at least on of the following types of explosion-protected electrical equipment connected to supplies up to 1,000V a.c or 1,500V d.c. for which endorsement applies:

- Flame proof (Ex d)
- Increased safety (Ex e)
- Intrinsically safety (Ex i)

Note:

1. Each endorsement achieved is to be reported separately.
2. Limitations of this unit. This unit does not cover the knowledge and skills necessary for work:
  - a) Where high fault currents are possible,
  - b) On complex electrical apparatus and circuits, and
  - c) Associated with fixed wiring other than disconnecting and reconnecting explosion-protected electrical equipment listed in the Range Statement of the unit.
3. Safe Working  
Safe procedures for working within in the scope of this unit shall be in accordance with AS/NZS 4836:2001 'Safe working on low-voltage electrical installations.'

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most

effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Disconnect and reconnect explosion-protected electrical equipment connected to Low Voltage supply as described in

7) for each endorsement and including:

- A Demonstrating consistent performance for each element of the unit
- B Meeting the Performance Criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace
- C Demonstrating an understanding of the underpinning knowledge and skills shown in the Essential Knowledge and Associated Skills section of the unit
- D Preparing to disconnecting explosion-protected electrical equipment
- E Disconnecting of explosion-protected electrical equipment
- F Preparing to reconnect explosion-protected electrical equipment
- G Reconnecting explosion-protected electrical equipment
- H Testing of the reconnected explosion-protected electrical equipment for safe operation
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in disconnecting and reconnecting explosion-protected electrical equipment connected to Low Voltage supply.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.2; 3.5	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application:  1.3; 2.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  3.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2; 4.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All

2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.3
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  N/A

## **UEENEEP005A Disconnect and reconnect 3.3 kV electric propulsion components of self-propelled earth moving vehicles**

### **Unit Descriptor**

1)

This unit covers isolating, disconnecting and reconnecting HV electric propulsion components on engine driven, self-propelled earth moving vehicles under the restrictions of designated electrical equipment and conditions specified, operating at 3,300 volts. It encompasses working safely, identifying circuit and isolation arrangements, following isolation procedures, selecting and using HV testing and measuring devices, terminating and connecting HV cables and conductors, safety testing and reporting.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Competency in the units is to be determined only after competency has been achieved in a relevant field to which the electrical work is incidental or a primary and regular ancillary function of the work to the primary work function, unless otherwise specified in a regulated Vocational Training Order/Agreement/Program. Such requirement is expected to include a broad application of skills and knowledge related to occupational health and safety in the selection, and knowledge, and use of, general hand and power tools relative to mechanical maintenance of HV electric propulsion components off-road earth moving trucks.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit applies to any formal recognition for this standard at the aligned AQF 3 level or higher.

**Licence to practise 3.1)**

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Restricted and Specialisations

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare for disconnection or reconnection.

1.1 Designated electrical equipment to be replaced is identified and purpose of the work to be carried out is verified with the authorised personnel.

1.2 Occupational health and safety and other statutory requirements and established procedures are followed.

1.3 Work clearances are obtained; isolation and disconnection procedures are followed in accordance with established procedures.

2 Disconnect designated electrical equipment.

2.1 Relevant electrical characteristics and protection specifications are identified.

2.2 Where appropriate on –board cables are identified and marked and connection sequence recorded.

2.3 Designated electrical equipment is inspected for damage to components, and conclusions verified with authorised personnel..

2.4 On –board cables are, where appropriate, disconnected without unnecessary damage to terminals or components.

2.5 Designated electrical equipment is dismantled, removed and/or replaced in accordance with requirements to the extent necessary for disconnection, and without unnecessary damage.

- |   |  |  |   |
|---|--|--|---|
|   | 2.6  | Designated electrical equipment parts and/or associated components are stored appropriately to protect them against damage.      |   |
|   | 2.7  | Repairs, where appropriate, to the removed equipment are carried out in accordance with requirements and established procedures. |   |
| 3 | Reconnect designated electrical equipment.                     | 3.1  | Cables, where appropriate, are re-connected without damage to terminals or components.  |
|   |  | 3.2  | Connections are checked and tested to confirm correct polarity and continuity.  |
|   |  | 3.3  | Designated electrical equipment is assembled and checked to comply with the relevant Standards for the given technique.                           |
|   |  | 3.4  | Designated electrical equipment is tested for safety and correct operation.   |
| 4 | Prepare designated electrical equipment for return to service. | 4.1  | Isolation devices are removed and work clearance is released in accordance with established procedures.   |
|   |  | 4.2  | Documentation is completed in accordance with established procedures.   |
|   |  | 4.3  | Operational personnel are notified when designated electrical equipment is ready for return to service in accordance with established procedures. |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and disconnecting and reconnecting 3.3 kV electric propulsion components of self-propelled earth moving vehicles.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |  |
|---------|--|
| 2.18.1  | Occupational Health and Safety principles                  |
| 2.18.2  | Electrical safe working practices                          |
| 2.19.32 | Disconnect and reconnect HV electric propulsion components |
| 2.19.39 | Produce Status Reports using established procedures        |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to disconnecting and reconnecting of HV electric propulsion components of HV electric propulsion components on engine driven, self-propelled earth moving vehicles operating at 3,300 volts.

Note:

Limitations of this unit. This unit does not cover the knowledge and skills necessary for work:

- a) Where high fault currents are possible,
- b) On complex electrical work;
- c) Associated with other than to disconnect and reconnect of HV electric propulsion components of off-road HV electric propulsion components on engine driven, self-propelled earth moving vehicles earth moving vehicles operating at 3,300 volts
- d) Nor competencies associated with fixed wiring

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of

evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Disconnect and reconnect 3.3 kV electric propulsion components of self-propelled earth moving vehicles as described in 7) and including:
    - A Preparing to disconnect or reconnect of HV electric propulsion components of off-road self-propelled earth moving vehicles operating at 3,300 volts
    - B Disconnecting of HV electric propulsion components of off-road HV electric propulsion components on

engine driven, self-propelled earth moving vehicles operating at 3,300 volts

- C Repairing in accordance with established procedures HV electric propulsion components of off-road HV electric propulsion components on engine driven, self-propelled earth moving vehicles operating at 3,300 volts
- D Reconnecting of HV electric propulsion components of off-road self-propelled earth moving vehicles operating at 3,300 volts
- E Preparing of HV electric propulsion components of off-road HV electric propulsion components on engine driven, self-propelled earth moving vehicles operating at 3,300 volts for return to service
- F Providing status report(s);
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in disconnecting and reconnecting 3.3 kV electric propulsion components of self-propelled earth moving vehicles.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:  
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**  
There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**  
Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 3.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.7	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2; 4.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5

## **UEENEEP006A Attach flexible cables and plugs to electrical equipment connected to a high voltage supply**

### **Unit Descriptor**

1)

This unit covers attach flexible cable(s) and plug(s), including trailing and feeder cables, to high voltage electrical equipment connected to a supply exceeding 1,000 volts a.c. or 1,500 volts d.c. This may be incidental to or a primary and regular function of work related to a principle function in the workplace – typically mining. It encompasses working safely, identifying plug configurations, selecting and using testing and measuring devices, terminating and connecting HV flexible cables, plugs and conductors, safety testing and reporting.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEP003A Attach cords and plugs to electrical equipment for connection to 1000 Va.c. or 1500 Vd.c. supply.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit applies to any formal recognition for this standard at the aligned AQF 3 level or higher.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts

of training such as apprenticeships.

**Competency Field 4)**

Restricted and Specialisations

**ELEMENT PERFORMANCE CRITERIA**

<p><b>5)</b> Elements describe the essential outcomes of a unit of competency</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.</p>
<p>1 Plan and prepare to attach flexible cable(s) and plug(s).</p>	<p>1.1 Work is planned and prepared to ensure OHS policies and procedures are followed, and the work is appropriately sequenced in accordance with requirements.</p> <p>1.2 Condition and ratings under which the flexible cable(s) and plug(s) is to operate is determined from requirements and in consultation with appropriate personnel followed by written instruction.</p> <p>1.3 Flexible cable(s) and plug(s) are selected to comply with standards and requirements for the condition and rating to be determined.</p> <p>1.4 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements.</p> <p>1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.</p>
<p>2 Attach flexible cable(s) and plug(s).</p>	<p>2.1 OHS policies and procedures are followed.</p> <p>2.2 Flexible cable(s) is prepared without damage to insulation and conductors and in accordance with requirements.</p> <p>2.3 Equipment is earthed in accordance with requirements.</p> <p>2.4 The integrity of insulated equipment is maintained in accordance with requirements.</p> <p>2.5 Conductors are connected to terminals in accordance with requirements to ensure the required polarity is affected.</p>

- |   |  |     |   |
|---|--|-----|---|
| 3 | Test equipment for operation and safety. | 3.1 | Appropriate tests are conducted of the electrical equipment high voltage to ensure safe installation and operation.                                   |
|   |  | 3.2 | Approval is obtained from authorised personnel to confirm completion of work is in accordance with established procedures before supply is connected. |
| 4 | Provide status report(s).                | 4.1 | Status report(s) are completed and notified in accordance with established procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and attaching flexible cables and plugs to electrical equipment connected to a high voltage supply.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- |         |   |
|---------|---|
| 2.18.1  | Occupational Health and Safety principles               |
| 2.18.2  | Electrical safe working principles                      |
| 2.19.33 | High voltage flexible cables and plugs exceeding 1000 V |
| 2.19.39 | Produce Status Reports using established procedures     |

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to flexible cables and plugs for connecting equipment intended to operate at high voltage.

Note:

Limitations of this unit. This unit does not cover the knowledge and skills necessary for work:

- a) Where high fault currents are possible,
- b) On complex electrical work;
- c) Nor competencies associated with fixed wiring

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Attach flexible cables and plugs to electrical equipment connected to a high voltage supply as described in 7) and including:
    - A Planing and preparing to attach flexible cable(s) and plug(s) connected to HV electrical equipment
    - B Attaching, replacing and repairing flexible cable(s) and plug(s) connected to HV electrical equipment
    - C Testing flexible cable(s), plug(s) and electrical equipment connected to HV electrical equipment for operation and safety
    - D Providing status report(s)
    - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with

the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in attaching flexible cables and plugs to electrical equipment connected to a high voltage supply.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2	2
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: 3.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.2; 4.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5

## **UEENEEP007A      Locate and rectify faults in electrical low voltage equipment following prescribed procedures**

### **Unit Descriptor**

1)

This unit covers locating and rectifying fault(s) in electrical equipment intended to operate to a connected supply up to 1,000 volts a.c. or 1,500 volts d.c. This may be incidental to or a primary and regular function in the workplace. It encompasses following prescribed procedures, working safely, reading circuit diagrams, isolation procedures, identifying faults according to procedures, identifying like for like replacement/repair components according to procedures, selecting and using testing and measuring devices, terminating and connecting cables and conductors, safety testing and reporting.

### **Prerequisite Unit(s)**

2)

### **Competencies**

2.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UNITNEEP001A    Disconnect and reconnect fixed wired electrical equipment connected to supply up to 1,000V a.c or 1,500V d.c.

### **Literacy and numeracy skills**

2.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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### **Application of the Unit**

3)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

### **Licence to practise**

3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to

occupational health and safety and where applicable contracts of training such as apprenticeships.

**Competency Field 4)**

Restricted and Specialisations

**ELEMENT**

**PERFORMANCE CRITERIA**

5) Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.

1 Prepare to identify fault(s)

- 1.1 Nature of the fault(s) is confirmed in accordance with established procedures and appropriate personnel.
- 1.2 The work is planned to ensure OHS policies and established procedures are followed.
- 1.3 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.4 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
- 1.5 Possible electrical equipment fault(s) are checked against job requirements and in accordance with established procedures.
- 1.6 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements.
- 1.7 Electrical characteristics of electrical equipment and electrical supply are determined and recorded in accordance with established procedures.
- 1.8 Electrical equipment and associated circuits are identified for isolation purposes, where necessary, in accordance with established procedures.

2 Locate fault(s) in the electrical equipment.

- 2.1 Electrical equipment and associated circuits are isolated, where necessary, in accordance with prescribed procedures.
- 2.2 Other OHS policies and procedures are followed.

- 2.3 Visual checks of the electrical equipment and components are carried out in accordance with prescribed procedures to detect any abnormal or obvious damage or fault.
- 2.4 Safety tests and circuit continuity are progressively carried out to assure isolation, and to detect operational, electrical or other non-conformances or fault(s).
- 2.5 Electrical equipment is dismantled and/or removed, where necessary, and components stored in accordance with established procedures to protect them against loss or damage.
- 2.6 Fault(s) are confirmed and components to be replaced or adjusted are determined and details recorded in accordance with prescribed procedures.
- 2.7 Ongoing checks of the quality of work are undertaken in accordance with established procedures.
- 3 Rectify fault(s).
  - 3.1 Isolation of electrical equipment and associated circuits is confirmed in accordance with requirements and prescribed procedures.
  - 3.2 Materials and resources necessary to complete the work are obtained in accordance with established procedures and checked against job requirements.
  - 3.3 Adjustments are made in accordance with prescribed procedures, where necessary, to ensure electrical equipment operates in accordance with intended parameters.
  - 3.4 Fault(s) are rectified in accordance with prescribed procedures, where necessary.
  - 3.5 Approval is obtained in accordance with prescribed procedures from appropriate personnel, before any contingencies are implemented.
  - 3.6 Tests on the electrical equipment are in accordance with prescribed procedures performed to ensure safe return to service and operation of the electrical equipment.
- 4 Provide status report(s).
  - 4.1 Status report(s) are completed and notified in accordance with established procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and locate and rectify faults in electrical low voltage equipment following prescribed procedures.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- General single phase motors, composite equipment, and/or control devices:
  - 2.18.1 Occupational Health and Safety principles
  - 2.18.13 Appliance servicing working practices
  - 2.19.36 Fault find to 250 V – General Principles
  - 2.19.39 Produce Status Reports using established procedures
- Multi phase motor endorsements, composite equipment, and/or control devices
  - 2.18.1 Occupational Health and Safety principles
  - 2.18.2 Electrical safe working practices
  - 2.19.34 Fault find to 250 V - Motors
  - 2.19.37 Fault find to 1000 V - Motors
  - 2.19.39 Produce Status Reports using established procedures
- Water heater endorsements
  - 2.18.1 Occupational Health and Safety principles
  - 2.18.2 Electrical safe working practices
  - 2.19.35 Fault find to 250 V – Water heaters
  - 2.19.38 Fault find to 1000 V – Water heaters
  - 2.19.39 Produce Status Reports using established procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall/may be demonstrated in relation to be demonstrated in relation to locating and rectifying fault(s) in at least one of the following types of electrical equipment endorsement intended to operate to a connected fixed wired supply up to 1,000V a.c or 1,500V d.c:

- Composite equipment incorporating one or more current-using devices and/or controls (P)

Note: Examples of composite equipment are a self-contained refrigeration unit, machine tools, and modular telephone booths.

- Control devices (Q)
- Electrical water heaters (R)
- Motors (S)

Note:

1. Each endorsement achieved is to be reported separately.
2. Limitations of this unit. This unit does not cover the knowledge and skills necessary for work:
  - a) Where high fault currents are possible,
  - b) On complex electrical apparatus and circuits, and
  - c) Associated with fixed wiring other than disconnecting and reconnecting electrical equipment, circuits at a switchboard or to general electrical accessories (including switches, socket outlets, circuit protective devices etc); or installation of or alteration to any part of the fixed electrical wiring system (defined as electrical installing work).listed in the Range Statement of the unit,
  - d) In hazardous areas or on electrical equipment that is part of an explosion protection technique.
3. Safe Working  
Safe procedures for working within in the scope of this unit shall be in accordance with AS/NZS 4836:2001 'Safe working on low-voltage electrical installations.'

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships.

However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

**Critical aspects of evidence required to demonstrate competency in this unit**

**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE06'. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Locate and rectify faults in electrical low voltage equipment following prescribed procedures as described in 7) for each endorsement and including:
    - A Following safe work practices and procedures
    - B Identification, testing and isolation of electrical equipment according to requirements
    - C Preparing to locate faults and repairing electrical equipment according to requirement/procedures
    - D Using routine fault finding techniques and procedures
    - E Identifying and locating fault(s) in accordance with requirements
    - F Preparation to replace like for like, implementing routine repairs and reconnecting electrical equipment as per procedures
    - G Rectifying electrical equipment fault(s) in accordance with requirements
    - H Returning to service and testing for polarity and continuity in accordance with requirements/procedures
    - I Returning to service and testing for polarity and continuity in accordance with requirements/procedures
    - J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in locating and rectifying faults in electrical low voltage equipment following prescribed procedures.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application: 1.2; 3.5	1
How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 1.3; 2.2	2

How are activities planned and organised?	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application:  1.2	2
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application:  3.4	2
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application:  3.5	2
How is use of technology applied?	Refer to the following Performance Criteria for examples of application:  2.2; 4.2	2

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All
3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application:  4.1

4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.4
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application:  1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application:  3.5

## **UEENEEP008A      Conduct in-service safety testing of electrical cord assemblies and cord connected equipment**

**Unit Descriptor**                    1)

This unit covers safety testing of electrical cord assemblies and cord connected equipment. It encompasses working safely, using portable apparatus tester, identifying faults, applying tagging, arranging for repair of faulty equipment and complete testing documentation.

**Prerequisite Unit(s)**            2)

**Competencies**                    2.1)

There are no prerequisite competencies for this unit.

**Literacy and numeracy skills**            2.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3
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**Application of the Unit**                                    3)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

**Licence to practise**                    3.1)

The skills and knowledge described in this unit may require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety, general electrical safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

**Competency Field 4)**

Restricted and Specialisations

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
5) Elements describe the essential outcomes of a unit of competency	Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
1 Prepare to test cord assemblies and cord connected apparatus	<p>1.1 OHS procedures for a given work area are identified, obtained and understood</p> <p>1.2 OHS risk control work preparation measures and procedures are followed.</p> <p>1.3 Advice is sought from an appropriate person to minimise disruption to the work place.</p> <p>1.4 Cord assemblies and cord connected apparatus to be tested are obtained.</p> <p>1.5 Portable apparatus testing device is checked for correct operation and safety.</p>
2 Test cord assemblies and cord connected apparatus	<p>2.1 OHS risk control work measures and procedures are followed.</p> <p>2.2 Measures are followed to ensure that cord assemblies and cord connected apparatus to be tested are not connected to the electrical supply.</p> <p>2.3 Knowledge of electrical safety requirements and parameters are applied to safety testing to ensure correct interpretation of test results.</p> <p>2.4 Established PAT routines are followed to test cord assemblies and cord connected apparatus.</p> <p>2.5 Unsafe cord assemblies and cord connected apparatus are identified from test results</p> <p>2.6 Testing is undertaken effectively with minimum waste of energy and damage to apparatus.</p>
3 Tag tested cord assemblies and cord connected apparatus and document testing activities	<p>3.1 OHS work completion risk control measures and procedures are followed.</p> <p>3.2 Work site is cleaned and made safe in accordance with established procedures.</p> <p>3.3 Cord assemblies and cord connected apparatus are tagged according to their safety status.</p>

- 3.4 Arrangements are made for unsafe cord assemblies and cord connected apparatus to be repaired by a recognised competent person.
- 3.5 Safety testing activities are documented in accordance with requirements and established routines procedures.

## REQUIRED SKILLS AND KNOWLEDGE

6) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conduct in-service safety testing of electrical cord assemblies and cord connected equipment.

The extent of the essential knowledge and associated skills (EKAS) required is given in Volume 2 - Part 2.2 EKAS. It forms an integral part of this unit.

- 2.5.2.3 Technical standards, regulations and codes for testing and tagging portable and cord connected electrical apparatus
- 2.6.1 Protection devices and applications
- 2.8.1.1 Basic electrical principles
- 2.11.5 Basic electrical testing and measuring devices and techniques
- 2.11.15 Portable apparatus testing (PAT) devices
- 2.18.1 Occupational Health and Safety principles
- 2.18.2 Electrical Safe working practices
- 2.19.39 Produce Status Reports using established procedures

## RANGE STATEMENT

7) This relates to the unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to in-service safety testing of at least two different electrical cords and two different items of cord connected equipment with safety faults.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

## EVIDENCE GUIDE

8) This provides essential advice for assessment of the unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

### Overview of Assessment

#### 8.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

### Critical aspects of evidence required to demonstrate

#### 8.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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**competency in  
this unit**

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UEE06’. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
  - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Conduct in-service safety testing of electrical cord assemblies and cord connected equipment as described in 7) and including:
    - A Preparing the portable apparatus tester
    - B Connecting cords and apparatus to the testing apparatus
    - C Using test results to establish the safety status
    - D Identifying safe and unsafe cords and apparatus
    - E Applying appropriate tagging
    - F Documenting testing activities
    - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with Performance Criteria and critical aspects of evidence shall be clearly identified.

**Context of and specific resources for assessment**

**8.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency in conducting in-service safety testing of electrical cord assemblies and cord connected equipment.

**Method of assessment**

**8.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent assessment and relationship with other units**

**8.5)**

There are no concurrent assessment recommendations for this unit.

**Key competencies**

**8.6)**

Evidence of achievement of particular key competencies is assessed in the context of the following performance criteria. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

<b>Key competencies</b>	<b>Example of Application</b>	<b>Performance Level</b>
How are ideas and information communicated within this competency?	Refer to the following Performance Criteria for examples of application:  1.3; 3.5	1

How can information be collected, analysed and organised?	Refer to the following Performance Criteria for examples of application: 2.3; 2.4	1
How are activities planned and organised?	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5	1
How is team work used within this competency?	Refer to the following Performance Criteria for examples of application: 1.3	1
How are mathematical ideas and techniques used?	Refer to the following Performance Criteria for examples of application: N/A	
How are problem solving skills applied?	Refer to the following Performance Criteria for examples of application: 2.3 to 2.5	1
How is use of technology applied?	Refer to the following Performance Criteria for examples of application: 2.3 to 2.5	1

**Skills Enabling Employment 8.7)**

Evidence that competency in this unit incorporates skills enabling employment is assessed in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

<b>Skills for Employment</b>		<b>Example of Application</b>
1	Developing and using skills within a real workplace	Refer to the following Performance Criteria for examples of application:  All
2	Learning to learn in the workplace	Refer to the following Performance Criteria for examples of application:  All

3	Reflecting on the outcome and process of work task	Refer to the following Performance Criteria for examples of application: 1.3; 3.5
4	Interacting and understanding of the context of the work task	Refer to the following Performance Criteria for examples of application: 1.4 to 2.5; 3.3 to 3.5
5	Planning and organising the meaningful work task	Refer to the following Performance Criteria for examples of application: 1.1 to 1.5
6	Performing the work task in non-routine or contingent situations	Refer to the following Performance Criteria for examples of application: N/A



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.2**

**EKAS/CSU Maps**

**Volume 2 of 2**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## Essential Knowledge and Associated Skills (EKAS) – Maps

The information in this section is provided to assist users in developing holistic training support materials for respective qualifications and/or Competency Standard Units

### Map 1 – Unit to Essential Knowledge and Associated Skills Relationship

#### A – Assembly Units

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEA001A Assemble electronic apparatus	2.11.11.2 Surface mount soldering techniques
	2.18.1 Occupational Health and Safety principles
UEENEEA002A Select electronic components	2.9.1.1 Electronic component basics
	2.18.1 Occupational Health and Safety principles
UEENEEA003A Set up and check electronic component placement machines	2.11.16 Electronic component place equipment
	2.18.1 Occupational Health and Safety principles
UEENEEA004A Rework electronic sub assemblies	2.2.6 Enterprise quality management system, basics
	2.11.11.3 Printed circuit board repair techniques
	2.18.1 Occupational Health and Safety principles
UEENEEA005A Conduct functional and quality tests on assembled electronic apparatus	2.11.18 Electronic assembly functional and quality testing
	2.18.1 Occupational Health and Safety principles
UEENEEA006A Apply lead-free soldering techniques	2.2.6 Enterprise quality management system, basics
	2.11.11.4 Lead-free soldering technology
	2.18.1 Occupational Health and Safety principles
UEENEEA007A to A009A Reserved	Reserved
UEENEEA010A Assemble, mount and connect switchgear and controlgear	2.6.6.2 Alternating current rotating machines
	2.6.24.1 Switchgear/controlgear
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEA011A Reserved	Reserved
UEENEEA012A Make up and assemble bus bars	2.1.5.2 Bus bar techniques
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEA013A Assemble and wire control panels	2.1.5.1 Power cable and conductor terminations
	2.3.1 Electrical control devices
	2.3.2 Control circuit fundamentals

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.6.8.2 Single and three-phase transformers
	2.6.24.2 Control panel wiring
	2.7.4.1 Electrical installations, protection methods and devices
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices

**B – Broadcast Units**

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEB001A Operate and maintain an amateur radio communication station	2.10.32 Amateur radio communication principles, practices, and technical overview
	2.18.1 Occupational Health and Safety principles

## C – Common and commercial units

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills
UEENEEC001A Maintain documentation	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.2.20 Computer use basics
	2.18.1 Occupational Health and Safety principles
UEENEEC002A Source and purchase material/parts for installation or service jobs	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.2.7 Enterprise purchasing system
	2.2.20 Computer use basics
	2.18.1 Occupational Health and Safety principles
UEENEEC003A Provide quotations for installation or service jobs	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.2.5 Enterprise customer relations protocols
	2.2.8 Enterprise costing methods
	2.2.10 Job costing techniques
	2.18.1 Occupational Health and Safety principles
UEENEEC004A Prepare specifications for the supply of materials and equipment for electrotechnology projects	2.2.11.2 Specification development
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEC005A Estimate electrotechnology projects	2.2.11.1 Estimating techniques
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEC006A Prepare tender submissions for electrotechnology projects	2.2.12 Tendering requirements
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEC007A Manage contract variations	2.2.11.1 Estimating techniques
	2.2.14 Contracts, format, responsibilities and obligations
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEC008A Receive and store	2.2.1 Enterprise communication methods

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills
materials and equipment for electrotechnology work	2.2.2 Enterprise work activities records
	2.2.9 Enterprise stock control methods
	2.2.20 Computer use basics
	2.18.1 Occupational Health and Safety principles
UEENEEC009A Provide quotations for inspection and compliance audit services	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.2.5 Enterprise customer relations protocols
	2.2.8 Enterprise costing methods
	2.2.10 Job costing techniques
	2.18.1 Occupational Health and Safety principles
UEENEEC010A Deliver a service to customers	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.2.4 Problem solving techniques
	2.2.5 Enterprise customer relations protocols
	2.2.6 Enterprise quality management system, basics
	2.2.13 User instruction techniques
	2.18.1 Occupational Health and Safety principles
UEENEEC011A	Reserved
UEENEEC012A Direct technical and non-technical enquiries to appropriate personnel	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.2.5 Enterprise customer relations protocols
	2.2.6 Enterprise quality management system, basics
	2.2.22 Enterprise work/business coverage
	2.18.1 Occupational Health and Safety principles
UEENEEC013A Participate in business equipment work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC014A Participate in computer equipment work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills
UEENEEC015A Participate in electronic installations work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC016A Participate in voice and data communications work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC017A Participate in appliance servicing work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC018A Participate in electrical machine repair work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC019A Participate in switchgear and controlgearwork and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC020A Participate in electrical work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures

UEENEEC021A Participate in electronics and communications work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC022A Participate in fire protection control work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC023A Participate in gaming electronic work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC024A Participate in instrumentation and control work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC025A Participate in refrigeration and air conditioning work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC026A Participate in security equipment work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC027A Participate in rail communications and networks work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures

UEENEEC028A Participate in hazardous areas work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures
UEENEEC029A Participate in explosion-protected equipment overhaul work and competency development activities	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
	2.2.48 Enterprise work activities policies and procedures

## D – Computerised systems units

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills
UEENEED001A Use basic computer applications relevant to a workplace	2.2.20 Computer use basics
	2.18.1 Occupational Health and Safety principles
UEENEED002A Assemble, set up and test personal computers	2.4.11 Personal computers, hardware structure
	2.4.12.1 Computer hardware sub-assemblies
	2.4.14 Personal computer operating systems, basics
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEED003A Evaluate and modify programs written in object oriented code	2.4.43.1 Object oriented programming basics
	2.18.1 Occupational Health and Safety principles
UEENEED004A Use engineering applications software	2.4.16 Personal computers, engineering applications software basic
	2.18.1 Occupational Health and Safety principles
UEENEED005A Enter and verify operating instruction in microprocessor equipped devices	2.3.7 Smart device basics
	2.18.1 Occupational Health and Safety principles
UEENEED006A	Reserved
UEENEED007A Develop, enter and verify programs for programmable logic controllers using ladder instruction set	2.3.8 Programmable controller basics
	2.3.9 PLC programming basics
	2.3.10.1 PLC programming
	2.7.13 Electrical installations, programmable logic controller requirements
	2.18.1 Occupational Health and Safety principles
UEENEED008A Develop, enter and verify programs in Supervisory Control and Data Acquisition systems	2.3.14 Supervisory control and data acquisition systems programming
	2.18.1 Occupational Health and Safety principles
UEENEED009A Develop, enter and verify programs for industrial control systems using high level instructions	2.3.10.2 PLC high level programming
	2.18.1 Occupational Health and Safety principles
UEENEED010A Set up and create content for a web server	2.4.20 Programming elements
	2.4.21 Client side programming
	2.4.22 Server scripting
	2.4.23 Database access
	2.4.24 Web application and services
	2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills
UEENEED011A Create object oriented code	2.4.43.2 Object oriented programming
	2.18.1 Occupational Health and Safety principles
UEENEED012A Support computers software and hardware	2.4.3.2 Networking fundamentals
	2.4.13 Computer peripherals
	2.4.15 Computer operating systems
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEED013A Install and administer Unix based computers	2.4.15 Computer operating systems
	2.4.27.1 Unix fundamentals
	2.18.1 Occupational Health and Safety principles
	OR
	2.4.15 Computer operating systems
	2.4.27.2 Linux fundamentals
	2.18.1 Occupational Health and Safety principles
	OR
	2.4.15 Computer operating systems
	2.4.27.3 Mac OSX fundamentals
UEENEED014A Design and manage enterprise networks	2.4.25.2 Network services design processes
	2.4.26 Network services management processes
	2.18.1 Occupational Health and Safety principles
UEENEED015A Administer user networks	2.4.27.1 Unix fundamentals
	2.4.28 Network operating systems essentials
	2.4.29 Network operating systems implementation
	2.18.1 Occupational Health and Safety principles
UEENEED016A Develop network services	2.4.30 Network infrastructure
	2.4.31 Directory services
	2.18.1 Occupational Health and Safety principles
UEENEED017A Install and configure Internetworking systems	2.1.7.1 Performance (copper) data cable installation and terminations
	2.1.7.2 Coaxial cable installation and terminations
	2.1.7.3 Optical fibre cabling installation and terminations
	2.4.3.2 Networking fundamentals
	2.4.39 Internet, network basics

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills
	2.4.40 Internet, network routing
	2.5.7 Technical standards, regulations and codes for telecommunications cabling
	2.18.1 Occupational Health and Safety principles
UEENEED018A Design and implement internetworking systems	2.4.41 Internet, local area networking
	2.4.42 Internet, wide area networking
	2.18.1 Occupational Health and Safety principles
UEENEED019A Design and implement internetworking systems – advanced routing	2.4.34 Routing methods and protocols
	2.18.1 Occupational Health and Safety principles
UEENEED020A Design and implement internetworking systems – remote access	2.4.35 Networks, remote access
	2.18.1 Occupational Health and Safety principles
UEENEED021A Design and implement internetworking systems – multi-layer switching	2.4.36 Multi-layer switched networks
	2.18.1 Occupational Health and Safety principles
UEENEED022A Design and implement internetworking systems – security	2.4.37 Fundamentals of network security
	2.18.1 Occupational Health and Safety principles
UEENEED023A Design and implement internetworking systems – wireless LANs/WANs	2.4.38 Fundamentals of wireless security
	2.18.1 Occupational Health and Safety principles
UEENEED024A Integrate multiple computer operating systems on a client server network	2.4.32 Operating systems and networks fundamentals
	2.4.33 Operating systems and networks
	2.18.1 Occupational Health and Safety principles
UEENEED025A Design and configure Human-Machine Interface networks	2.3.11 Control system network basics
	2.4.30 Network infrastructure
	2.18.1 Occupational Health and Safety principles
UEENEED026A Design a computer based control system	2.3.10.3 PLC system applications
	2.3.12 Control network infrastructure
	2.3.19 Control programming fundamentals
	2.18.1 Occupational Health and Safety principles
UEENEED027A Develop structured programs for control sub systems to access external devices	2.3.19 Control programming fundamentals
	2.18.1 Occupational Health and Safety principles
UEENEED028A Develop and test basic specification for microcontroller equipped devices.	2.3.20 Microcontroller programming basics
	2.9.5.1 Microprocessor fundamentals
	2.9.5.2 Microcontroller fundamentals

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills
	2.18.1 Occupational Health and Safety principles
UEENEED029A Develop basic web pages for engineering applications	2.4.21 Client side programming
	2.4.22 Server scripting
	2.18.1 Occupational Health and Safety principles
UEENEED030A Select, install, configure and test multimedia devices	2.4.12.2 Multimedia computer components
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEED031A Develop and validate basic integrated systems	2.3.16 Integrated systems basics
	2.18.1 Occupational Health and Safety principles
UEENEED032A Design integrated systems	2.3.17 Integrated systems, subsystem interworking
	2.18.1 Occupational Health and Safety principles
UEENEED033A Design complex integrated systems	2.3.18 Complex integrated system programming
	2.18.1 Occupational Health and Safety principles
UEENEED034A Configure and maintain industrial control system networks	2.3.11 Control system network basics
	2.3.12 Control network infrastructure
	2.18.1 Occupational Health and Safety principles
UEENEED035A to UEENEED042A	Reserved
UEENEED043A Install and configure a computer operating system and software	2.4.14 Personal computer operating systems, basics
	2.4.15 Computer operating systems
	2.18.1 Occupational Health and Safety principles
UEENEED044A and UEENEED045A	Reserved
UEENEED046A Set up and configure basic local area network	2.4.25.1 Local area network fundamentals
	2.18.1 Occupational Health and Safety principles
UEENEED047A Manage computer projects	2.2.17 Project management
	2.2.19 Customer/Client relations
	2.2.27 Computer industry sector customs and practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEED048A Plan computer systems projects	2.2.16.1 Project Planning
	2.2.18 Critical path and project analysis
	2.2.27 Computer industry sector customs and practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills
UEENEED049A	Reserved
UEENEED050A Develop control programs for microcomputer equipped devices	2.3.20 Microcontroller programming basics
	2.4.44.1 Microprocessor/microcontroller assembler language programming
	2.4.44.2 High level programming
	2.18.1 Occupational Health and Safety principles
UEENEED051A Provide programming solution for engineering problems	2.4.44.2 High level programming
	2.4.44.3 Advanced high-level programming
	2.10.1.2 Electronic signals and systems
	2.18.1 Occupational Health and Safety principles
UEENEED052A Design embedded controller systems	2.3.3 Process control principles
	2.9.4.2 Digital signal processing
	2.9.4.3 Digital signal processing development
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEED053A Set up and test biometric devices	2.9.71.1 Biometric devices
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEED054A – Analyse and implement biometric techniques and applications	2.9.71.2 Biometrics Equipment Techniques and Applications
	2.9.71.3 Biometric Systems Techniques and Applications
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEED055A – Develop and validate biometric systems installation	2.9.71.2 Biometrics Equipment Techniques and Applications
	2.9.71.3 Biometric Systems Techniques and Applications
	2.9.71.4 Biometrics and Security
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices

**E – Cross-discipline units**

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
UEENEEE001A Apply OHS practices in the workplace	2.18.1 Occupational Health and Safety principles
UEENEEE002A Dismantle, assemble and fabricate electrotechnology components	2.11.1 Hand tools
	2.11.2.1 Power tools
	2.11.4 Dismantling and assembling techniques
	2.18.1 Occupational Health and Safety principles
UEENEEE003A Solve problems in extra-low voltage single path circuits	2.8.1.2 Fundamental electrical principles
	2.18.1 Occupational Health and Safety principles
UEENEEE004A Solve problems in multiple path d.c circuits	2.8.2.1 Direct current circuit principles
	2.18.1 Occupational Health and Safety principles
UEENEEE005A Fix and secure equipment	2.11.1 Hand tools
	2.11.2.1 Power tools
	2.11.3.1 Fixing and support devices and techniques
	2.18.1 Occupational Health and Safety principles
UEENEEE006A Apply methods to maintain currency of industry developments	2.2.44 Requirements and methods for maintaining currency in industry developments
	2.18.1 Occupational Health and Safety principles
UEENEEE007A Use drawings, diagrams, schedules and service manuals	2.5.1.2 Drawings and diagrams
	2.18.1 Occupational Health and Safety principles
UEENEEE008A Lay wiring and terminate accessories for extra-low voltage circuits	2.1.1 Cable protection and support
	2.1.2 Cable types and applications
	2.1.3 Cables in buildings, structures and premises
	2.1.4 Basic cable and conductor terminations
	2.5.5 Technical standards, regulations and codes for extra-low voltage work
	2.5.11 Environmental and heritage awareness
	2.18.1 Occupational Health and Safety principles
UEENEEE009A Comply with scheduled and preventative maintenance program processes	2.13.8 Schedule maintenance processors
	2.18.1 Occupational Health and Safety principles
UEENEEE010A Develop and implement maintenance programs	2.13.8 Schedule maintenance processors
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEE011A Manage risk in electrotechnology activities	2.2.15 Risk management, application and techniques
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE012A Manage electrotechnology projects	2.2.17 Project management
	2.2.19 Customer/Client relations
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE013A Plan electrotechnology projects	2.2.16.1 Project Planning
	2.2.18 Critical path and project analysis
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE014A Supervise and coordinate work activities	2.2.4 Problem solving techniques
	2.2.6 Enterprise quality management system, basics
	2.2.19 Customer/Client relations
	2.2.41 Supervision fundamentals
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE015A Develop design briefs for electrotechnology projects	2.2.5 Enterprise customer relation protocols
	2.2.18 Critical path and project analysis
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE016A Write specifications for electrotechnology projects	2.2.6 Enterprise quality management systems, basics
	2.2.7 Enterprise purchasing system
	2.2.10 Job costing techniques
	2.2.11.2 Specification development
	2.2.15 Risk management, application and techniques
	2.2.18 Critical path and project analysis
	2.2.19 Customer/client relations
	2.2.20 Computer use basics
	2.2.25 Research concepts
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE017A Implement and monitor OHS policies and procedures	2.18.8.1 Occupational Health and Safety, supervisory responsibilities

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEE018A Establish, maintain and evaluate OHS systems	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE019A Solve problems in multiple path a.c. circuits	2.8.2.2 Alternating current principles-power
	2.8.6 Electromagnetic principles
	2.11.1 Hand tools
	2.18.1 Occupational Health and Safety principles
UEENEEE020A Provide basic instruction in the use of electrotechnology apparatus	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.2.5 Enterprise customer relations protocols
	2.2.13 User instruction techniques
	2.18.1 Occupational Health and Safety principles
UEENEEE021A Plan an integrated cabling system	2.1.11 Integrated cabling arrangements
	2.5.2.1 Technical standards, regulations and codes for general electrical installations
	2.5.7 Technical standards, regulations and codes for telecommunications cabling
	2.5.9 Building codes, applicable to general electrotechnology installations
	2.7.4.2 Electrical installations, circuit arrangements and cable selection
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEE022A Carry out preparatory electrotechnology work activities	2.1.1 Cable protection and support
	2.11.1 Hand tools
	2.11.2.1 Power tools
	2.11.3.1 Fixing and support devices and techniques
	2.18.1 Occupational Health and Safety principles
UEENEEE023A Solve basic problems in electronic and digital equipment	2.9.1.5 Basic electronic principles
	2.9.1.6 Basic digital principles
	2.18.1 Occupational Health and Safety principles
UEENEEE024A Compile and produce an electrotechnology report	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.2.20 Computer use basics
	2.2.21 Engineering analysis, decision making and reporting
	2.2.25 Research concepts

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.2.33 Working in a team
	2.2.35 Data collection techniques
	2.2.36 Data analysis and presentation
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE025A Solve problems in complex multiple path circuits	2.8.9.1 Circuit analysis
	2.18.1 Occupational Health and Safety principles
UEENEEE026A Provide computational solutions to engineering problems	2.8.10.1 Engineering maths fundamentals
	2.8.10.2 Engineering maths
	2.18.1 Occupational Health and Safety principles
UEENEEE027A Use advanced computational processes to provide solutions to engineering problems	2.8.10.3 Advanced Engineering maths
	2.18.1 Occupational Health and Safety principles
UEENEEE028A Develop engineering solutions to photonic problems	2.9.87 Photonic principles and applications
	2.18.1 Occupational Health and Safety principles
UEENEEE029A Solve electrotechnical problems	2.8.1.3 Electrotechnical principles
	2.18.1 Occupational Health and Safety principles
UEENEEE030A Provide solutions to and report on routine electrotechnology problems	2.8.14.3 Electrotechnology Numeracy Diagnostic Assessment Methods
	2.8.14.4 Electrotechnology Literacy Diagnostic Assessment Methods
	2.18.1 Occupational Health and Safety principles
UEENEEE031A	RESERVED
UEENEEE032A Document occupational hazards and risks in computer systems	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.18.1 Occupational Health and Safety principles
	2.18.16 Documenting hazards and identifying risks
UEENEEE033A Document occupational hazards and risks in electrical	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.18.1 Occupational Health and Safety principles
	2.18.16 Documenting hazards and identifying risks
UEENEEE034A Document occupational hazards and risks in electronics	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.18.1 Occupational Health and Safety principles
	2.18.16 Documenting hazards and identifying risks
UEENEEE035A Document	2.2.1 Enterprise communication methods

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
occupational hazards and risks in instrumentation	2.2.2 Enterprise work activities records
	2.18.1 Occupational Health and Safety principles
	2.18.16 Documenting hazards and identifying risks
UEENEEE036A Document occupational hazards and risks in refrigeration and air-conditioning	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.18.1 Occupational Health and Safety principles
	2.18.16 Documenting hazards and identifying risks
UEENEEE037A Document occupational hazards and risks in electrotechnology	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.18.1 Occupational Health and Safety principles
	2.18.16 Documenting hazards and identifying risks
UEENEEE038A Participate in development and follow a personal competency development plan	2.2.45 Responsibilities under a competency development plan
	2.2.46 Methods of monitoring and reporting competency development activities
UEENEEE039A	RESERVED
UEENEEE040A Identify and select components/accessories/materials for electrotechnology work activities	2.2.40 Electrotechnology industry organisations and practices
	2.8.1.2 Fundamental electrical principles
	2.8.2.1 Direct current circuit principles
	2.8.13 Parts and component selection
	2.18.1 Occupational Health and Safety principles
UEENEEE041A Use of routine equipment/plant/technologies in an electrotechnology environment	2.2.40 Electrotechnology industry organisations and practices
	2.8.1.2 Fundamental electrical principles
	2.8.13 Parts and component selection
	2.18.1 Occupational Health and Safety principles
UEENEEE042A Produce routine products for carrying out electrotechnology work activities	2.2.40 Electrotechnology Industry organisations and practices
	2.5.1.1 Drawings interpretation and sketching
	2.8.1.2 Fundamental electrical principles
	2.8.2.1 Direct current circuit principles
	2.8.13 Parts and component selection
	2.11.1 Hand tools 2.11.2.1 Power tools

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.11.4 Dismantling and assembling techniques 2.11.13.2 Introduction to welding 2.11.19 Electrotechnology engineering practices 2.18.1 Occupational health and safety principles
UEENEEE043A Produce routine tools/devices for carrying out electrotechnology work activities	2.2.40 Electrotechnology Industry organisations and practices 2.5.1.1 Drawings interpretation and sketching 2.8.1.2 Fundamental electrical principles 2.8.2.1 Direct current circuit principles 2.8.13 Parts and component selection 2.11.1 Hand tools 2.11.2.1 Power tools 2.11.4 Dismantling and assembling techniques 2.11.13.2 Introduction to welding 2.11.19 Electrotechnology engineering practices 2.18.1 Occupational health and safety principles
UEENEEE044A Apply technologies and concepts to electrotechnology work activities	2.2.20 Computer use basics 2.2.40 Electrotechnology industry organisations and practices 2.4.11 Personal computers hardware structure 2.5.1.1 Drawings Interpretation and Sketching 2.8.1.2 Fundamental electrical principles 2.8.2.1 Direct current circuit principles 2.8.13 Parts and component selection 2.11.1 Hand tools 2.11.2.1 Power tools 2.11.4 Dismantling and assembling techniques 2.18.1 Occupational Health and Safety principles
UEENEEE045A Apply computation when using equipment/materials/concepts in an electrotechnology environment	2.2.40 Electrotechnology industry organisations and practices 2.8.1.2 Fundamental electrical principles 2.8.2.1 Direct current circuit principles 2.8.13 Parts and component selection 2.8.15.1 Applied mathematical concepts 2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEE046A Identify effects of energy on machinery and materials in an electrotechnology environment	2.8.15.2 Applied physics concepts
	2.18.1 Occupational Health and Safety principles
UEENEEE047A Identify building techniques, methods and materials used in electrotechnology work activities	2.2.40 Electrotechnology organisations and practices
	2.5.1.1 Drawings Interpretation and Sketching
	2.7.1.1 Electrotechnology, building systems and materials
	2.8.8 Electrotechnology science and materials
	2.8.1.2 Fundamental electrical principles
	2.8.2.1 Direct current circuit principles
	2.8.13 Parts and component selection
	2.11.1 Hand tools
	2.11.2.1 Power tools
	2.11.4 Dismantling and assembling techniques
UEENEEE048A Carry out routine work activities in an electrotechnology environment	2.2.40 Electrotechnology organisations and practices
	2.8.1.2 Fundamental electrical principles
	2.8.2.1 Direct current circuit principles
	2.18.1 Occupational Health and Safety principles
UEENEEE049A Contribute to the operation of support plant and equipment used in electricity supply	2.2.40 Electrotechnology organisations and practices
	2.5.1.1 Drawings Interpretation and Sketching
	2.8.1.2 Fundamental electrical principles
	2.8.2.1 Direct current circuit principles
	2.8.8 Electrotechnology science and materials
	2.8.13 Parts and component selection
	2.11.1 Hand tools
	2.11.2.1 Power tools
	2.11.4 Dismantling and assembling techniques
UEENEEE050A Undertake computations in an electrotechnology environment	2.8.15.1 Applied mathematical concepts
	2.18.1 Occupational Health and Safety principles
UEENEEE051A Transport apparatus	2.2.1 Enterprise communication methods

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
and materials	2.2.2 Enterprise work activities records
	2.2.4 Problem solving techniques
	2.2.5 Enterprise customer relations protocols
	2.2.9 Enterprise stock control methods
	2.18.1 Occupational Health and Safety principles
UEENEEE060A Provide solutions for uses of materials and thermodynamic effects	2.21.9 Material science
	2.21.10 Thermodynamics
	2.18.1 Occupational Health and Safety principles
UEENEEE061A Analyse static and dynamic parameters of equipment	2.21.4 Statics and dynamics
	2.18.1 Occupational Health and Safety principles
UEENEEE062A Select drive components for equipment design	2.21.2 Mechanical drives and engineering
	2.18.1 Occupational Health and Safety principles
UEENEEE063A Analyse materials for suitability in equipment	2.21.3 Materials and strengths of materials
	2.18.1 Occupational Health and Safety principles
UEENEEE064A Design machine drives and production layout plans	2.21.1 Machine design and positioning
	2.18.1 Occupational Health and Safety principles
UEENEEE065 to E069	RESERVED
UEENEEE070 Write specifications for computer systems engineering projects	2.2.11.2 Specification development
	2.2.19 Customer/client relations
	2.2.20 Computer use basics
	2.2.25 Research concepts
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE071A Write specifications for electrical engineering projects	2.2.11.2 Specification development
	2.2.19 Customer/client relations
	2.2.20 Computer use basics
	2.2.25 Research concepts
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE072A Write specifications for electronics and communications engineering projects	2.2.11.2 Specification development
	2.2.19 Customer/client relations
	2.2.20 Computer use basics
	2.2.25 Research concepts
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEE073A Write specifications for refrigeration and air conditioning engineering projects	2.2.11.2 Specification development
	2.2.19 Customer/client relations
	2.2.20 Computer use basics
	2.2.25 Research concepts
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE074A Write specifications for renewable energy engineering projects	2.2.11.2 Specification development
	2.2.19 Customer/client relations
	2.2.20 Computer use basics
	2.2.25 Research concepts
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE075A Write specifications for industrial electronics and control projects	2.2.11.2 Specification development
	2.2.19 Customer/client relations
	2.2.20 Computer use basics
	2.2.25 Research concepts
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEE076A (Reserved)	RESERVED
UEENEEE077A Write specifications for automated systems projects	2.2.11.2 Specification development
	2.2.19 Customer/client relations
	2.2.20 Computer use basics
	2.2.25 Research concepts
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities

**F – Data and voice communication units**

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEF001A Lay and connect cables cabling for direct access to telecommunication services	2.4.1.1 Telecommunications CPR regulations and installations
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEF002A Lay and connect cables for multiple access to telecommunication services	2.1.1 Cable protection and support
	2.1.2 Cable types and applications
	2.1.3 Cables in buildings, structures and premises
	2.1.6.1 Telecommunication cable and conductor terminations
	2.4.1.2 Telephone system fundamentals
	2.4.2.1 Telecommunication earthing and protection
	2.5.7 Technical standards, regulations and codes for telecommunications cabling
	2.5.11 Environmental and heritage awareness
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEF003A Install and maintain cabling for telecommunication services in lifts	2.1.1 Cable protection and support
	2.4.1.4 Lift telecommunications cabling regulations and installation
	2.5.11 Environmental and heritage awareness
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEF004A Install and maintain high performance data communication structured cabling	2.1.7.1 Performance (copper) data cable installation and terminations
	2.11.8 Data and voice cabling testing devices
	2.13.8 Schedule maintenance processors
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEF005A Install and modify performance data communication optical fibre cabling	2.1.7.3 Optical fibre cabling installation and terminations
	2.11.8 Data and voice cabling testing devices
	2.13.8 Schedule maintenance processors
	2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.18.2 Electrical safe working practices
UEENEEF006A Solve problems in data and voice communications circuits	2.10.31 Electrotechnology communications principles
	2.18.1 Occupational Health and Safety principles
UEENEEF007A Set up the wireless capabilities of communications and data storage devices	2.10.30 Wireless devices
	2.18.1 Occupational Health and Safety principles
UEENEEF008A Select and arrange equipment for wireless networks	2.2.2 Enterprise work activities records
	2.4.1.2 Telephone system fundamentals
	2.4.3.2 Networking fundamentals
	2.18.1 Occupational Health and Safety principles
UEENEEF009A Install and connect voice and data communications equipment	2.4.3.2 Networking fundamentals
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEF010A Select and arrange equipment for local area networks	2.1.7.1 Performance (copper) data cable installation and terminations
	2.1.7.2 Coaxial cable installation and terminations
	2.1.7.3 Optical fibre cabling installation and terminations
	2.2.2 Enterprise work activities records
	2.4.1.2 Telephone system fundamentals
	2.4.2.1 Telecommunication earthing and protection
	2.4.3.2 Networking fundamentals
	2.4.6 PABX fundamentals
	2.4.8 Switches, hubs and routers
	2.4.9 Decoders
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEF011A Test, report and rectify faults in voice and data communication installations	2.4.3.2 Networking fundamentals
	2.11.5 Basic electrical testing and measuring devices and techniques
	2.11.8 Data and voice cabling testing and testing devices
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEF012A Install aerial	2.1.6.2 Telecommunication aerial cabling

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
communication cables	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.14 Aerial safety practice
UEENEEF013A Install below ground communication cables	2.1.6.3 Telecommunication below ground cabling
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.15 Trenching safety practices
UEENEEF014A Set up and configure basic data communications systems	2.4.3.1 Data Communication Fundamentals
	2.18.1 Occupational Health and Safety Principles
UEENEEF015A Assemble and connect communication frames and cabinets	2.1.6.4 Voice and data cabinet cabling terminations
	2.4.2.2 Voice and data cabinet assembly and terminations
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices

**G – Electrical units**

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
UEENEEG001A Solve problems in electrical power circuits.	2.8.6 Electromagnetic principles
	2.11.1 Hand tools
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG002A Solve problems in single and three phase low voltage circuits	2.8.2.2 Alternating current principles – power
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG003A Install wiring and accessories for low voltage circuits	2.1.3 Cables in buildings, structures and premises
	2.1.5.1 Power cable and conductor terminations
	2.5.2.1 Technical standards, regulations and codes for general electrical installations
	2.5.11 Environmental and heritage awareness
	2.6.6.2 Alternating current rotating machines
	2.6.8.2 Single and three-phase transformers
	2.6.9.2 Luminaires and lighting systems
	2.7.1.2 Electrical installations, wiring and accessories
	2.7.1.3 Electrical wiring systems
	2.7.2 Electrical installations, equipment requirements
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG004A Install low voltage electrical apparatus and associated equipment	2.1.3 Cables in buildings, structures and premises
	2.1.5.1 Power cable and conductor terminations
	2.5.2.1 Technical standards, regulations and codes for electrical installations
	2.5.11 Environmental and heritage awareness
	2.7.1.2 Electrical installations, wiring and accessories
	2.7.1.3 Electrical wiring systems
	2.7.2 Electrical installations, equipment requirements
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEG005A Verify compliance and functionality of general electrical installations	2.7.5.1 Electrical installations, testing and verification
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG006A (Reserved)	Reserved
UEENEEG007A Select and arrange equipment for general electrical installations	2.1.1 Cable protection and support
	2.1.2 Cable types and applications
	2.1.3 Cables in buildings, structures and premises
	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.3.1 Electrical control devices
	2.5.1.2 Drawings and diagrams
	2.5.2.1 Technical standards, regulations and codes for electrical installations
	2.5.2.2 Technical standards, regulations and codes for special electrical installations
	2.5.10 Technical manuals and catalogues
	2.5.11 Environmental and heritage awareness
	2.6.1 Protection devices and applications
	2.6.2.1 Switchboards/distribution boards
	2.7.1.2 Electrical installations, wiring and accessories
	2.7.1.3 Electrical wiring systems
	2.7.2 Electrical installations, equipment requirements
	2.7.3 Electrical installations, safety principles and requirements
	2.7.4.1 Electrical installations, protection methods and devices
	2.7.4.2 Electrical installations, circuit arrangements and cable selection
	2.11.3.1 Fixing and support devices and techniques
2.18.1 Occupational Health and Safety principles	
UEENEEG008A Find and repair faults in electrical apparatus and circuits	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.2.3 Fault finding techniques

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.3.1 Electrical control devices 2.3.2 Control circuit fundamentals 2.5.2.1 Technical standards regulations and codes for general electrical installations 2.5.10 Technical manuals and catalogues 2.6.6.2 Alternating current rotating machines 2.6.8.2 Single and three-phase transformers 2.6.9.1 Lighting fundamentals 2.6.9.2 Luminaires and lighting systems 2.6.10 Electrical heating 2.7.1.2 Electrical installations, wiring and accessories 2.7.4.1 Electrical installations, protection methods and devices 2.7.4.2 Electrical installations, circuit arrangements and cable selection 2.8.6 Electromagnetic principles 2.9.77 Electronic components and system, industrial applications 2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices
UEENEEG009A Develop and connect control circuits	2.2.1 Enterprise communication methods 2.2.2 Enterprise work activities records 2.2.3 Fault finding techniques 2.3.1 Electrical control devices 2.3.2 Control circuit fundamentals 2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices
UEENEEG010A Find and repair faults in d.c. electrical apparatus and circuits	2.6.12 Direct current machines 2.6.16 Direct current motor controls 2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices
UEENEEG011A Carry out basic repairs to electrical apparatus	2.1.4 Basic cable and conductor terminations 2.11.2.2 Electrical workshop machines 2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.18.2 Electrical safe working practices
UEENEEG012A Solve fundamental problems in electrical systems	2.8.2.2 Alternating current principles – power
	2.8.6 Electromagnetic principles
	2.8.8 Electrotechnology science and materials
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG013A Install and maintain emergency systems.	2.6.17 Cells and batteries
	2.7.6 Electrical installations, emergency systems
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG014A Develop plans and compliance policies to conduct a contracting business	2.2.23 Enterprise regulatory requirements and non regulatory standards
	2.5.2.1 Technical standards, regulations and codes for general electrical installations
	2.5.2.2 Technical standards, regulations and codes for special electrical installations
	2.5.12 Electricity distributors, supply requirements
	2.5.13 Electricity regulatory safety requirements
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEG015A Find and rectify faults in energy supply network equipment	2.2.3 Fault finding techniques
	2.6.21 Electricity supply and reticulation
	2.6.22.1 Electrical power system protection
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG016A Diagnose and Rectify Faults in Lifts Systems	2.5.3 Technical standards, regulations and codes for lifts and escalators
	2.6.46 Lift systems – basic operations
	2.6.47 Lift components – electro-mechanical
	2.6.48 Electric lifts – mechanics
	2.6.49 Electro – hydraulic lifts
	2.6.50 Electro-hydraulic lifts – mechanical operation
	2.6.51 Emergency release procedures – trapped passengers
	2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEG017A Install electrical power and control equipment for rail network signalling	2.7.2 Electrical installations, equipment requirements
	2.14.1 Basic rail operations
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG018A Maintain operation of electrical mining equipment	2.5.19 Technical standards, regulations and codes for mining
	2.6.20 Electrical mining systems overview
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.6 Hazardous area safe working practices
UEENEEG019A Maintain the operation of electrical marine equipment	2.6.17 Cells and batteries
	2.6.23 Marine Electrical Systems overview
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG020A Select and arrange equipment for special electrical installations	2.5.2.2 Technical standards, regulations and codes for special electrical installations
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG021A Verify compliance and functionality of special electrical installations	2.5.2.2 Technical standards, regulations and codes for special electrical installations
	2.7.5.2 Electrical installations, testing and verification of special installations
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG022A Conduct compliance inspection of single phase electrical installations	2.2.2 Enterprise work activities records
	2.2.5 Enterprise customer relations protocols
	2.5.12 Electricity distributors, supply requirements
	2.5.13 Electricity regulatory safety requirements
	2.7.9.1 Electrical installations, single phase inspections
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG023A Conduct compliance inspection of electrical installations	2.7.9.2 Electrical installations, inspections and safety compliance audits

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
with demand exceeding 100A per phase	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG024A Conduct compliance inspection of special electrical installations	2.5.2.2 Technical standards, regulations and codes for special electrical installations
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG025A Plan electrical installations with a LV demand up to 400A per phase	2.6.2.2 Electrical metering arrangements
	2.7.3 Electrical installations, safety principles and requirements
	2.7.4 1 Electrical installations, protection methods and devices
	2.7.4.2 Electrical installations, circuit arrangements and cable selection
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG026A Install and maintain field power and distribution systems with a LV demand up to 200A per phase	2.6.3 Single phase alternators
	2.6.4 Three phase alternators
	2.6.32 Field power and distribution systems
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG027A Design electrical installations with a LV demand greater than 400V per phase	2.5.12 Electricity distributors, supply requirements
	2.7.4.3 Electrical installations, advanced methods of cable and protection selection
	2.7.5.1 Electrical installations, testing and verification
	2.7.5.2 Electrical installations, testing and verification of special installations
	2.7.10 Electrical installations, determination of demand
	2.7.11 Electrical installations, overcurrent protection
	2.7.12 Electrical installations, overvoltage and undervoltage protection
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	UEENEEG028A Plan switchboard and control panel layouts
2.6.1 Protection devices and applications	

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.6.2.1 Switchboards/distribution boards
	2.6.2.2 Electrical metering arrangements
	2.6.24.1 Switchgear/controlgear
	2.6.24.2 Control panel wiring
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG029A Overhaul and repair switchgear/controlgear	2.6.24.1 Switchgear/controlgear
	2.7.4.1 Electrical installations, protection methods and devices
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG030A Design switchboards rated for high fault levels	2.8.2.2 Alternating current principles – power
	2.8.8 Electrotechnology science and materials
	2.8.15.3 Fault current calculations
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG031A Evaluate performance of electrical apparatus	2.5.23 Performance standards and regulatory requirement for electrical equipment
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG032A Carry out electrical field testing and report findings	2.2.1 Enterprise communication methods
	2.2.2 Enterprise work activities records
	2.11.6.1 Advance electrical testing and measuring devices
	2.11.6.2 Electrical field testing and measurement techniques
	2.11.6.3 Power cable fault detection techniques
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG033A (Reserved)	RESERVED
UEENEEG034A Perform high voltage field switching operation to a given schedule	T2.4.3 High voltage switching principles
	T2.4.4 High voltage fault switching principles
	T2.4.5 High voltage distribution transformer principles
	T2.4.6 High voltage SWER system

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	T2.4.7 Feeder automation system
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG035A Diagnose and rectify faults in a.c. motor drive systems	2.6.33 Variable speed drives for a.c. motors
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG036A Diagnose and rectify faults in d.c. motor drive systems	2.6.34 Variable speed drives for d.c. motors
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG037A Diagnose and rectify faults in energy supply apparatus	2.6.22.2 Electrical power system operations
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG038A Diagnose and rectify faults in electrical energy distribution systems	2.6.22.6 Electrical power distribution systems diagnostic
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEG039A Diagnose and rectify faults in distributed generation systems	2.6.22.4 Distributive generation systems
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEG040A Develop engineering solutions for energy supply power transformer problems	2.6.8.3 Power transformers diagnostics
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG041A Diagnose and rectify faults in servo drive systems	2.6.35 Servomechanism systems
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG042A Diagnose and rectify faults in electrical energy supply transmission system	2.6.22.3 Electrical power system transmission faults
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG043A Develop engineering solution for synchronous machine problems	2.6.36 Synchronous machine diagnostics
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEG044A Develop engineering solution for d.c. machine problems	2.6.38 Direct current machines diagnostics
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG045A Develop engineering solution for induction motor problems	2.6.37 Induction motors diagnostics
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG046A Develop solutions for energy supply system protection problems	2.6.22.5 Electrical power system protection diagnostic
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG047A Provide computational solutions to power engineering problems	2.8.11 Power engineering computations
	2.18.1 Occupational Health and Safety principles
UEENEEG048A Solve problems in complex multiple path power circuits	2.8.9.2 Electrical power circuit analysis
	2.18.1 Occupational Health and Safety principles
UEENEEG049A Solve problems in complex polyphase power circuits	2.8.9.3 Polyphase power circuit analysis
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG050A Wind coils	2.6.29 Coil winding basics
	2.6.30 Coil testing
	2.18.1 Occupational Health and Safety principles
UEENEEG051A Place and connect coils	2.1.9 Winding wire types and connections
	2.6.31.1 Electrical machine winding basic
	2.18.1 Occupational Health and Safety principles
UEENEEG052A Rewind single phase induction machines	2.3.2 Control circuit fundamentals
	2.6.6.2 Alternating current rotating machines
	2.6.31.1 Electrical machine winding basic
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG053A Rewind three phase induction machines rated for low voltage	2.6.8.2 Single and three-phase transformers
	2.6.28 Motor windings
	2.6.31.2 Low voltage three phase motor winding techniques
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEG054A Rewind direct current machines rated for low voltage	2.6.28 Motor windings
	2.6.31.3 Direct current motor winding techniques
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG055A Rewind three phase induction machines rated for high voltage to 3.3 kV	2.1.10 High voltage motor winding, conductors, connections methods and insulation
	2.6.31.4 High voltage three phase motor winding techniques
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG056A Rewind three phase induction machines rated for high voltage above 3.3 kV	2.1.10 High voltage motor winding, conductors, connections methods and insulation
	2.6.31.4 High voltage three phase motor winding techniques
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG057A Conduct electrical tests on low voltage electrical machines	2.7.4.1 Electrical installations, protection methods and devices
	2.11.20.1 Low voltage motor testing devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG058A Conduct electrical tests on high voltage electrical machines	2.11.20.2 High voltage motor testing devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG059A Conduct mechanical tests of electrical machines	2.6.31.5 Electrical machines, mechanical components
	2.11.20.3 Electric motor mechanical measuring and testing devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG060A Evaluate performance of electrical machines	2.5.22 Performance standards and regulatory requirements for the electrical rotating machine
	2.6.31.6 Electrical machines, performance monitoring
	2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.18.2 Electrical safe working practices
UEENEEG061A Design and develop modifications to electrical machines	2.6.28 Motor windings
	2.8.10.2 Engineering maths
	2.18.1 Occupational Health and Safety principles
UEENEEG062A Set up and place electrical apparatus and associated circuits into service	2.2.2 Enterprise work activities records
	2.2.4 Problem solving techniques
	2.2.5 Enterprise customer relations protocols
	2.2.43 Commissioning processes and procedures
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG063A (Reserved)	RESERVED
UEENEEG064A Repair mechanical components of electrical machines	2.6.31.5 Electrical machines, mechanical components
	2.11.2.2 Electrical workshop machines
	2.18.1 Occupational Health and Safety principles
UEENEEG065A Maintain and service traction lifts	2.6.39 Lubrication of lift components
	2.6.40 Lift systems, roping
	2.6.41 Lift systems, rope inspection
	2.18.1 Occupational Health and Safety principles
UEENEEG066A Install and maintain escalators, moving walks and tread ways	2.6.39 Lubrication of lift components
	2.6.42 Escalators, moving walk and tread way mechanics
	2.18.1 Occupational Health and Safety principles
UEENEEG067A Align and install lift equipment	2.6.43 Lift systems, plumbing and setting out
	2.6.44 Lift equipment alignment techniques
	2.18.1 Occupational Health and Safety Principles
UEENEEG068A Diagnose and rectify faults in complex lifts systems	2.6.45 Lift components - electrical/electronic
	2.18.1 Occupational Health and Safety principles
UEENEEG069A Manage electrical projects	2.2.17 Project management
	2.2.19 Customer/Client relations
	2.2.28 Electrical industry sector customs and practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEG070A Plan electrical	2.2.16.1 Project Planning

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
projects	2.2.18 Critical path and project analysis
	2.2.28 Electrical industry sector customs and practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEG071A Install and set up interval metering	2.5.2.1 Technical standards, regulations and codes for general electrical installations
	2.5.12 Electricity distributors, supply requirements
	2.6.2.2 Electrical metering arrangements
	2.6.2.3 Interval metering concepts and applications
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEG072A Investigate and report on electrical incidents	2.2.49 Procedure and protocols for giving evidence in a court of law
	2.7.14 Procedures and processes for responding to reported electrical incidents
	2.7.15 Causes and consequence of unsafe and misuse of electrical installations and equipment
	2.11.6.1 Advance electrical testing and measuring devices
	2.11.6.2 Electrical field testing and measurement techniques
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices

**H – Electronic units**

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEH001A Carry out basic repairs to computer equipment by replacement of modules/sub-assemblies	2.1.8 Electronic cable and conductor terminations
	2.4.11 Personal computers, hardware structure
	2.18.1 Occupational health and safety principles
	2.18.9 Electronic safe working practices
UEENEEH002A Carry out basic repairs to electronic equipment by replacement of components	2.1.4 Basic cable and conductor terminations
	2.1.8 Electronic cable and conductor terminations
	2.9.1.1 Electronic component basics
	2.11.11.1 Electronic soldering equipment and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH003A Carry out basic repairs to business equipment	2.1.8 Electronic cable and conductor terminations
	2.2.1 Enterprise communication methods
	2.4.18 Business equipment software basics
	2.9.73 Operational concepts of business machines
	2.9.74.1 Electro-mechanics of business machines
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH004A Set up and test residential audio/video equipment	2.1.8 Electronic cable and conductor terminations
	2.9.15 Audio and video component functional controls
	2.9.42 Audio and video system set up
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH005A Verify compliance and functionality of custom electronic installations	2.9.72 Custom electronic installations, testing and verification methods
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH006A Assemble and set up fixed audio/video components and systems in buildings and premises	2.5.5 Technical standards, regulations and codes for extra-low voltage work
	2.9.16.1 Sound reproduction fundamentals
	2.9.17.1 Audio reproduction, electronic components
	2.9.18 Audio reproduction, speaker fundamentals

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.9.19 Audio/video recording and replay components repair basics
	2.9.43 Video systems installation
	2.9.81 Audio/video control equipment
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH007A Carry out repairs of predictable faults in general electronic apparatus	2.5.10 Technical manuals and catalogues
	2.9.83 General electronic apparatus repair basics
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH008A Assemble and erect reception antennae and signal distribution equipment	2.1.7.2 Coaxial cable installation and terminations
	2.10.14 TV antenna systems
	2.10.15 Antenna installation and servicing
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH009A Set up and test gaming/games equipment	2.2.1 Enterprise communication methods
	2.2.5 Enterprise customer relations protocols
	2.5.18 Regulatory requirements and codes of practice for the gaming equipment
	2.9.22 Gaming machine systems and equipment overview
	2.9.23.1 Gaming machine equipment adjustment and maintenance
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH010A Install commercial audio/video system components	2.1.7.4 Specialist audio/video cabling installation and termination
	2.5.5 Technical standards, regulations and codes for extra-low voltage work
	2.9.16.1 Sound reproduction fundamentals
	2.9.17.1 Audio reproduction, electronic components
	2.9.18 Audio reproduction, speaker fundamentals
	2.9.19 Audio/video recording and replay components repair basics
	2.9.46 Professional audio electronics
	2.9.47 Loud speakers and microphones

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.9.80 Video and display set up 2.9.81 Audio/video control equipment 2.18.1 Occupational Health and Safety principles 2.18.9 Electronic safe working practices
UEENEEH011A Solve problems in d.c. power supplies with single phase input	2.9.12 Electronic fault finding 2.9.63 Direct current power supplies 2.18.1 Occupational Health and Safety principles 2.18.9 Electronic safe working practices 2.11.7.2 Advanced electronic testing and measuring devices and techniques
UEENEEH012A Solve problems in digital components of electronic apparatus	2. 9.4.1 Digital electronics fundamentals 2.9.12 Electronic fault finding 2.11.7.1 Electronic testing and measuring devices and techniques 2.18.1 Occupational Health and Safety principles 2.18.9 Electronic safe working practices
UEENEEH013A Solve problems in amplifier sections of electronic apparatus	2.9.9.1 Advanced amplifiers 2.9.9.2 Amplifier applications 2.18.1 Occupational Health and Safety principles 2.18.9 Electronic safe working practices 2.11.7.2 Advanced electronic testing and measuring devices and techniques
UEENEEH014A Solve problems in frequency dependant circuits	2.9.1.4 Frequency dependent circuit principles 2.11.7.1 Electronic testing and measuring devices and techniques 2.18.1 Occupational Health and Safety principles 2.18.9 Electronic safe working practices
UEENEEH015A Solve problems in microprocessor based hardware and firmware	2.9.5.1 Microprocessor fundamentals 2.9.12 Electronic fault finding 2.11.7.1 Electronic testing and measuring devices and techniques 2.18.1 Occupational Health and Safety principles 2.18.9 Electronic safe working practices 2.11.7.2 Advanced electronic testing and measuring devices and techniques

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEH016A Find and repair faults in the microwave amplifier sections of electronic apparatus	2.9.9.3 Microwave amplifiers
	2.9.12 Electronic fault finding
	2.11.7.1 Electronic testing and measuring devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH017A Carry out repairs of predictable faults in audio and video replay/recording apparatus	2.5.10 Technical manuals and catalogues
	2.9.19 Audio/video recording and replay components repair basics
	2.9.27 Digital versatile disc (DVD) and compact disc (CD)
	2.9.48 Digital audio
	2.9.52 Digital versatile disk processors
	2.9.53 Compact disk players
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH018A Find and repair faults in electronic apparatus	2.9.70 Automatic data capture
	2.9.71 Biometric devices
	2.9.77 Electronic components and system, industrial applications
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH019A Carry out repairs of predictable faults in television receivers	2.5.10 Technical manuals and catalogues
	2.9.29 Television scanning and deflection
	2.9.30 Television chrominance and luminance
	2.9.57.1 Introduction to television
	2.9.57.2 Television receiver repair basics
	2.18.1 Occupational Health and Safety principles
UEENEEH020A Find and repair faults in gaming and games equipment	2.4.19 Gaming equipment communications
	2.9.23.2 Gaming machine fault finding
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH021A Find and repair faults in high volume office equipment	2.4.45 Copier/printer software functions and configuration
	2.9.74.2 Business machine transducers

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.9.75.1 High volume business machine functions and faults
	2.9.75.2 Colour photocopiers operating principles
	2.9.75.3 Facsimile machine operating principles
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH022A Find and repair faults in remote control apparatus	2.9.28 Hand held remote control units
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH023A Find and repair faults in microwave heating apparatus	2.9.76 Microwave heating
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH024A Carry out repairs to predicable faults in audio components	2.5.10 Technical manuals and catalogues
	2.9.15 Audio and video component functional controls
	2.9.17.1 Audio reproduction, electronic components
	2.9.17.2 Audio component repair basics
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH025A Provide solution to single phase electronic power control problems	2.9.7.1 Single phase power control
	2.18.1 Occupational Health and Safety principles
UEENEEH026A Provide solutions to polyphase electronic power control problems	2.9.7.2 Polyphase power control
	2.18.1 Occupational Health and Safety principles
UEENEEH027A Commission commercial radio frequency (RF) transmission and reception systems	2.10.9 Electronic communications, antennas and wave propagation
	2.10.11 Electronic communications, satellite
	2.10.19 Electronic communications, commissioning process
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH028A Install microwave and antennae and waveguides	2.10.18 Electronic communications, microwave antennas and wave guide fundamentals
	2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.18.9 Electronic safe working practices
UEENEEH029A Diagnose and rectify faults in navigation systems	2.10.26 Electronic communications, navigation systems
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
	2.18.9 Electronic safe working practices
UEENEEH030A Diagnose and rectify faults in satellite-based surveillance and observation systems	2.10.11 Electronic communications, satellite
	2.10.27 Electronic communications, surveillance and observation
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
	2.18.9 Electronic safe working practices
UEENEEH031A Diagnose and rectify faults in radar apparatus and systems	2.10.23 Electronic communications, secondary radar and related systems
	2.10.24 Electronic communications, radar and sonar displays devices
	2.10.25 Electronic communications, radar fundamentals
	2.11.7.2 Advanced electronic testing and measuring devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
	2.18.9 Electronic safe working practices
UEENEEH032A Diagnose and rectify faults in global positioning systems	2.10.28 Electronic communications, global positioning systems
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
	2.18.9 Electronic safe working practices
UEENEEH033A Diagnose and rectify faults in telecommunication apparatus and systems	2.4.1.2 Telephone system fundamentals
	2.4.1.3 Telephone network facilities
	2.4.2.1 Telecommunication earthing and protection
	2.4.6 PABX fundamentals
	2.4.7 PABX programming

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.4.8 Switches, hubs and routers 2.4.9 Decoders 2.18.1 Occupational Health and Safety principles 2.18.8.2 Occupational Health and Safety, enterprise responsibilities 2.18.9 Electronic safe working practices
UEENEEH034A Diagnose and rectify faults in medical equipment	2.12.22.1 Medical equipment principles 2.12.22.2 Medical equipment, anatomy and physiology and infection control 2.18.1 Occupational Health and Safety principles 2.18.9 Electronic safe working practices 2.18.10 Medical equipment safe working practices
UEENEEH035A Design custom electronic installations	2.5.5 Technical standards, regulations and codes for extra-low voltage work 2.5.11 Environmental and heritage awareness 2.9.16.2 Acoustics, spatial treatment and sound reproduction 2.9.40 Integrated audio systems 2.9.80 Video and display set up 2.9.81 Audio/video control equipment 2.18.1 Occupational Health and Safety principles
UEENEEH036A Design commercial audio/video installations	2.5.5 Technical standards, regulations and codes for extra-low voltage work 2.5.11 Environmental and heritage awareness 2.6.9.3 Venue lighting for audio/video/live presentations 2.9.16.2 Acoustics, spatial treatment and sound reproduction 2.18.1 Occupational Health and Safety principles
UEENEEH037A Program and commission commercial audio/video systems	2.9.50 Commercial audio/video systems commissioning process 2.18.1 Occupational Health and Safety principles 2.18.9 Electronic safe working practices
UEENEEH038A Find and repair faults in complex power supplies	2.9.11 Linear and switch mode power supplies 2.9.65 Regulated power supplies 2.9.66 Switching power supplies

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.11.7.1 Electronic testing and measuring devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH039A Solve problems in basic amplifier circuits	2.9.8 Amplifier Fundamentals
	2.9.12 Electronic fault finding
	2.11.7.1 Electronic testing and measuring devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH040A Diagnose and rectify faults in sonar apparatus and systems	2.10.20 Electronic communications, sonar Transducers and arrays
	2.10.21 Electronic communications, sonar system operating principles
	2.10.22 Electronic communications, sonar measurement and set up
	2.10.24 Electronic communications, radar and sonar displays devices
	2.11.7.2 Advanced electronic testing and measuring devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
	2.18.9 Electronic safe working practices
UEENEEH041A Manage and implement electronic projects	2.2.17 Project management
	2.2.29 Electronic systems industry sector customs and practices
	2.2.19 Customer/Client relations
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEH042A Solve problems in oscillator sections of electronic apparatus	2.9.67 Feedback filters and oscillators
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH043A Diagnose and rectify faults in digital subsystems of electronic controls	2.9.4.1 Digital electronics fundamentals
	2.9.12 Electronic fault finding
	2.11.7.1 Electronic testing and measuring devices and techniques

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH044A Diagnose and rectify faults in analogue circuits and components in electronic control systems	2.9.8 Amplifier fundamentals
	2.9.9.1 Advanced amplifiers
	2.9.9.2 Amplifier applications
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
	2.18.9 Electronic safe working practices
UEENEEH045A Develop solutions to analogue electronic problems	2.9.84 Advanced analogue electronics
	2.9.85 Advanced power amplifiers
	2.18.1 Occupational Health and Safety principles
UEENEEH046A Solve fundamental problems in electronic communications systems	2.10.1.1 Electronic communications, principles
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH047A Assess compliance of electronic apparatus	2.2.24 Technical examination and testing methods
	2.5.8 Technical standards, regulations and codes for electronic apparatus
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH048A Design and develop advance digital systems	2.9.4.4 Digital applications
	2.11.7.2 Advanced electronic testing and measuring devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH049A Develop solutions to audio electronics problems	2.11.7.2 Advanced electronic testing and measuring devices and techniques
	2.9.16.2 Acoustics, spatial treatment and sound reproduction
	2.9.17.1 Audio reproduction, electronic components
	2.9.86 Audio system advance diagnostic techniques
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH050A Assemble and set up	2.5.11 Environmental and heritage awareness

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
basic wired and wireless security systems	2.5.20 Technical standards, regulations and codes for security systems
	2.9.41.1 Security systems installation basics
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH051A Install large wired and wireless security systems	2.9.59 Closed circuit televisions
	2.9.61 Advanced electronic security systems
	2.9.71.1 Biometric devices
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH052A Enter instructions and test basic wired and wireless security systems	2.4.46 Security systems basic software functions and configuration
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH053A Program and test large wired and wireless security systems	2.4.47 Security systems programming methods
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEH054A Program and commission commercial security alarm systems	2.4.48 Security systems alarms programming
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH055A Program and commission commercial security access control systems	2.4.49.1 Security systems access control programming
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH056A Program and commission commercial security closed circuit television (CCTV) systems	2.4.49.2 Security systems closed circuit television programming
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEH057A Develop basic integrated security systems plan	2.9.78 Common security scenarios and solutions
	2.18.1 Occupational Health and Safety principles
UEENEEH058A Design integrated security systems for a single site	2.4.50.1 Integrated security systems
	2.18.1 Occupational Health and Safety principles
UEENEEH059A Design integrated	2.4.50.2 Internetworking security systems

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
complex security systems	2.18.1 Occupational Health and Safety principles
UEENEEH060A Plan electronic projects	2.2.16.1 Project Planning
	2.2.18 Critical path and project analysis
	2.2.29 Electronic systems industry sector customs and practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEH061A Position and terminate fire detection and warning system apparatus	2.5.21 Technical standards, regulations and codes for fire protection and warning systems
	2.9.36 Fire detection and warning system and apparatus fundamentals
	2.9.79.1 Fire protection technologies
	2.18.1 Occupational Health and Safety principles
	2.18.11 Fire protection equipment safe working practices
UEENEEH062A Verify compliance and functionality of fire protection installations	2.5.21 Technical standards, regulations and codes for fire protection and warning systems
	2.7.5.3 Fire protection installations, testing and verification methods
	2.9.36 Fire detection and warning system and apparatus fundamentals
	2.9.37 Fire alarm routine testing
	2.9.79.1 Fire protection technologies
	2.18.1 Occupational Health and Safety principles
	2.18.11 Fire protection equipment safe working practices
UEENEEH063A Enter and verify programs in preparation for commissioning fire protection systems	2.4.51 Fire protection systems programming methods
	2.18.1 Occupational Health and Safety principles
	2.18.11 Fire protection equipment safe working practices
UEENEEH064A Commission commercial fire protection systems	2.9.79.2 Fire protection systems, commissioning process
	2.18.1 Occupational Health and Safety principles
	2.18.11 Fire protection equipment safe working practices
UEENEEH065A Find and repair faults in fire protection systems	2.2.3 Fault finding techniques
	2.2.4 Problem solving techniques

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.9.79.3 Fire protection systems faults
	2.18.1 Occupational Health and Safety principles
	2.18.11 Fire protection equipment safe working practices
UEENEEH066A Fault find Microcontroller based hardware	2.9.5.2 Microcontroller fundamentals
	2.9.12 Electronic fault finding
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH067A to UEENEEH069A	Reserved
UEENEEH070A Terminate and connect components, conductors, wiring and cables for electronic circuits	2.1.4 Basic cable and conductor terminations
	2.1.8 Electronic cable and conductor terminations
	2.9.1.1 Electronic component basics
	2.11.5 Basic electrical testing and measuring devices and techniques
	2.11.11.1 Electronic soldering equipment and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH071A Find and repair faults in television receivers	2.9.29 Television scanning and deflection
	2.9.30 Television chrominance and luminance
	2.9.31.2 Power supplies for TVs and VCRs
	2.9.31.3 Television RF Stages
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH072A Find and repair faults in the RF sections of electronic apparatus	2.9.9.2 Amplifier applications
	2.9.39 AM and FM tuners
	2.10.3 Electronic communications, modulation
	2.10.4 Electronic communications, modulation circuits
	2.10.5 Electronic communications, receivers
	2.10.6 Electronic communications, transmitters
	2.11.7.1 Electronic testing and measuring devices and techniques
	2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.18.9 Electronic safe working practices
UEENEEH073A Find and repair faults in professional audio reproduction components	2.9.16.1 Sound reproduction fundamentals
	2.9.17.1 Audio reproduction, electronic components
	2.9.45.1 Audio electronics
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH074A Find and repair faults in audio/video recording equipment	2.9.51 Camcorders
	2.9.52 Digital versatile disk processors
	2.9.53 Compact disk players
	2.9.54 VCR basic principles
	2.9.55 VCR fault finding
	2.9.56 VCR advanced principles
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH075A Find and rectify faults/malfunctions in security installations	2.9.41.2 Security systems installation faults
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEH076A Diagnose and repair faults in display circuits	2.9.24 Cathode ray tube displays
	2.9.25 Plasma displays
	2.9.26.1 Liquid crystal displays
	2.9.26.2 Display circuit diagnostics
	2.11.7.2 Advanced electronic testing and measuring devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEH077A Diagnose and repair faults in recording and replay apparatus	2.9.45.2 Recording and replay apparatus diagnostics
	2.11.7.2 Advanced electronic testing and measuring devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEH078A Diagnose and repair faults in camera circuits	2.9.32.1 Camcorders and digital cameras
	2.9.32.2 Camera circuits diagnostics
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEH079A Diagnose and repair faults in digital television apparatus	2.9.34.1 Digital Television Receivers
	2.9.34.2 Digital television principles
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEH080A Diagnose and rectify faults in digital transmission systems	2.9.34.3 Advanced digital television principles
	2.10.29 Digital television transmission towers and equipment
	2.18.1 Occupational Health and Safety principles
UEENEEH081A Design printed circuit board design	2.9.91 Printed circuit board design techniques
	2.9.1.2 Electronic component parameters and selection methods
	2.18.1 Occupational Health and Safety principles
UEENEEH082A Develop solutions to RF amplifiers problems	2.9.90 RF amplifiers
	2.18.1 Occupational Health and Safety principles
UEENEEH083A Analyse the performance of wireless-based electronic systems	2.4.3.2 Networking fundamentals
	2.4.4 Wireless networks infrastructure
	2.4.38 Fundamentals of wireless security
	2.10.7 Electronic communications, digital techniques
	2.18.1 Occupational Health and Safety principles
UEENEEH084A Design DSP based systems	2.8.10.4 Engineering Mathematics with Calculus
	2.9.4.2 Digital Signal Processing
	2.9.4.3 Digital Signal Processing development
	2.18.1 Occupational Health and Safety principles
UEENEEH085A Design electronic data acquisition systems	2.9.88 Principles of Signal Conditioning
	2.9.89 Analogue Integrated Circuits
	2.18.1 Occupational Health and Safety principles

**I – Instrumentation and control units**

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
UEENEEI001A Install and set up transducers and sensing devices	2.1.4 Basic cable and conductor terminations
	2.3.4 Pneumatic/hydraulic control tubing/piping
	2.5.14 Technical standards, regulations and codes applicable to instrumentation and control
	2.12.1 Instrumentation principles
	2.12.23 Transducers and sensing devices
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI002A Solve problems in pressure measurement systems	2.11.12 Instrumentation testing and measuring field devices
	2.12.2 Pressure
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI003A Solve problems in density/level measurement systems	2.11.12 Instrumentation testing and measuring field devices
	2.12.3 Density and level
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI004A Solve problems in flow measurement systems	2.11.12 Instrumentation testing and measuring field devices
	2.12.4 Fluid flow
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI005A Solve problems in temperature measurement systems	2.11.12 Instrumentation testing and measuring field devices
	2.12.5 Temperature
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI006A Solve problems in process controllers, transmitters and converters	2.3.3 Process control principles
	2.5.10 Technical manuals and catalogues
	2.5.14 Technical standards, regulations and codes applicable to instrumentation and control
	2.11.12 Instrumentation testing and measuring field devices

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.12.6 Process control systems
	2.12.10 Transmitters and converters
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI007A Install process instrumentation and control cabling and tubing	2.1.3 Cables in buildings, structures and premises
	2.1.4 Basic cable and conductor terminations
	2.1.8 Electronic cable and conductor terminations
	2.3.4 Pneumatic/hydraulic control tubing/piping
	2.5.14 Technical standards, regulations and codes applicable to instrumentation and control
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI008A Install process control apparatus and associated equipment	2.1.8 Electronic cable and conductor terminations
	2.3.4 Pneumatic/hydraulic control tubing/piping
	2.5.14 Technical standards, regulations and codes applicable to instrumentation and control
	2.12.20 Process equipment installation requirements and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI009A Set up process measuring and control instruments	2.12.11.1 Industrial processes
	2.12.14 Indicators and methods of recording process data
	2.12.15 Gas analysis
	2.12.16 Water analysis
	2.12.17 Scientific analysis
	2.12.18 Weight measurement principles
	2.12.19 Instrument calibration methods
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI010A Set up and adjust process control loops	2.12.11.1 Industrial processes
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI011A Find and rectify faults in process control valve and associated	2.12.7 Control valve principles
	2.12.8 Control valve selection

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
equipment	2.12.9 Actuators and positioners
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI012A Verify compliance and functionality of process control installations	2.12.21 Control system installation, testing and verification methods
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI013A Select equipment for process control systems	2.5.10 Technical manuals and catalogues
	2.5.14 Technical standards, regulations and codes applicable to instrumentation and control
	2.5.15 Measurement standards applicable to process instrumentation
	2.12.12 Distributive control principles (DCS)
	2.12.13 Instrumentation and control communications
	2.12.14 Indicators and methods of recording process data
	2.12.20.1 Process equipment installation requirements and techniques
	2.12.20.2 Process control arrangements and equipment selection
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI014A Find and rectify faults in process control systems	2.2.3 Fault finding techniques
	2.3.3 Process control principles
	2.12.6 Process control systems
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI015A Find and rectify faults in medical equipment control systems	2.12.22.1 Medical equipment principles
	2.12.22.2 Medical equipment, anatomy and physiology and infection control
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.7 Instrumentation safe working practices
	2.18.10 Medical equipment safe working practices
UEENEEI016A Reserved	RESERVED

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEI017A Calibrate and test measuring instruments	2.5.16 Measurement standards applicable to scientific instruments
	2.9.14 Fundamentals of calibration
	2.12.24 Calibration techniques
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI018A	RESERVED
UEENEEI019A Set up field control devices	2.1.4 Basic cable and conductor terminations
	2.3.4 Pneumatic/hydraulic control tubing/piping
	2.5.14 Technical standards, regulations and codes applicable to instrumentation and control
	2.12.23 Transducers and sensing devices
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI020A Provide solution to problems in basic industrial control systems	2.12.6 Process control systems
	2.18.1 Occupational Health and Safety principles
UEENEEI021A Find and repair faults in measuring and analysis systems	2.9.13 Measurement circuits and applications
	2.12.15 Gas analysis
	2.12.16 Water analysis
	2.12.17 Scientific analysis
	2.12.18 Weight measurement principles
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI022A Assist in commissioning process control systems	2.12.11.2 Process control, commissioning
	2.18.1 Occupational Health and Safety principles
	2.18.7 Instrumentation safe working practices
UEENEEI023A Design electronic control systems	2.3.21 Complex Control Systems
	2.18.1 Occupational Health and Safety principles
UEENEEI024A	RESERVED
UEENEEI025A Provide solutions to fluid circuit operations	2.21.13 Fluid power control
	2.18.1 Occupational Health and Safety principles
UEENEEI026A Provide solutions to pneumatic/hydraulic system operations	2.18.1 Occupational Health and Safety principles
	2.21.11 Pneumatics
	2.21.12 Hydraulics

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
UEENEEI027A Analyse complex electronic circuits controlling fluids	2.18.1 Occupational Health and Safety principles
	2.21.7 Electronic control of fluid processes
UEENEEI028A Set up controls on complex fluid systems	2.18.1 Occupational Health and Safety principles
	2.21.5 Advanced fluid mechanics
UEENEEI029A Set up electronically controlled mechanically operated complex systems	2.18.1 Occupational Health and Safety principles
	2.21.6 Electronic interfacing to mechanical processes
UEENEEI030A Set up electronically controlled robotically operated complex systems	2.18.1 Occupational Health and Safety principles
	2.21.8 Electronic interfacing to robotic processes
UEENEEI031A	RESERVED
UEENEEI032A	RESERVED
UEENEEI033A	RESERVED
UEENEEI034A Manage control projects	2.2.17 Project management
	2.2.19 Customer/Client relations
	2.2.30 Control systems industry sector customs and practices
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEI035A Plan control projects	2.2.16.1 Project Planning
	2.2.18 Critical path and project analysis
	2.2.30 Control systems industry sector customs and practices
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEI036A Manage automated systems projects	2.2.17 Project management
	2.2.19 Customer/Client relations
	2.2.26 Automated systems industry sector customs and practices
	2.18.1 Occupational Health and Safety principles
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEI037A Plan automated systems projects	2.2.16.1 Project Planning
	2.2.18 Critical path and project analysis

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
	2.2.26 Automated systems industry sector customs and practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities

**J – Refrigeration and air conditioning units**

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
UEENEEJ001A	RESERVED
UEENEEJ002A Prepare refrigeration tubing and fittings	2.11.13.1 Brazing and soldering equipment and techniques
	2.11.14 Piping and tubing techniques
	2.18.1 Occupational Health and Safety principles
UEENEEJ003A Determine the basic operating conditions of vapour compression systems	2.11.9.1 Basic refrigeration testing and measuring field devices
	2.11.9.2 Fitting and removing refrigeration service gauges
	2.15.1 Refrigeration compressors
	2.15.2 Condensers
	2.15.3 Evaporators
	2.17.1.1 Refrigeration fundamentals
	2.17.1.2 Basic refrigeration system operating conditions
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ004A Determine the basic operating conditions of air conditioning systems	2.11.10.1 Basic air conditioning measurement devices
	2.17.4 Air conditioning fundamentals
	2.18.1 Occupational Health and Safety principles
UEENEEJ005A Position, assemble and start up split air conditioning systems	2.16.6 Split air conditioning system installation
	2.18.1 Occupational Health and Safety principles
	2.18.3.2 Split air conditioning safe working practices
UEENEEJ006A Install pipework for refrigeration and air conditioning systems	2.3.5.1 Refrigerant pressure sensing controls
	2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
	2.15.1.4 Flow controls
	2.16.1 Refrigeration pipework and accessories
	2.16.2 Refrigeration pipework layout
	2.16.3 Refrigeration installations, equipment requirements
	2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.18.3.1 Refrigeration and air conditioning safe working practices
	2.20.1 Sustainable energy principles
	2.20.2 Environmental and heritage awareness
UEENEEJ007A Install refrigeration and air conditioning systems, major components and associated equipment	2.3.5.2 Refrigeration system control
	2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
	2.15.6 Fans and air distribution
	2.15.24 Cool rooms/freezer rooms systems
	2.15.25 Package air conditioning systems
	2.15.26 Merchandising and display cabinets
	2.15.27 Cooling towers, evaporative condensers, evaporative coolers and associated equipment
	2.15.28 Residential air conditioning
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
2.18.3.1 Refrigeration and air conditioning safe working practices	
UEENEEJ008A Recover, pressure and leak test, evacuate and charge refrigerants	2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
	2.11.9.3 Replacement of basic components on a refrigeration system
	2.17.2.1 Refrigerants
	2.17.2.4 High pressure refrigerants
	2.17.2.5 Natural refrigerants
	2.18.1 Occupational Health and Safety principles
2.18.3.1 Refrigeration and air conditioning safe working practices	
UEENEEJ009A Verify compliance and functionality of refrigeration and air conditioning installations	2.16.5 Refrigeration and air conditioning installations, testing and verification methods
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ010A Select refrigeration pipe/tube, accessories and associated controls	2.2.1 Enterprise communication methods
	2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.15.4.2 Refrigerant control selection
	2.16.1 Refrigeration pipework and accessories
	2.16.2 Refrigeration pipework layout
	2.16.3 Refrigeration installations, equipment requirements
	2.16.4 Refrigeration pipe selection and sizing
	2.17.3.1 Refrigeration systems capacity control
	2.18.1 Occupational Health and Safety principles
UEENEEJ011A Diagnose and rectify faults in refrigeration and air conditioning systems and components	2.15.9.1 Appliance refrigeration systems
	2.15.29 Servicing refrigeration and air conditioning systems
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ012A Diagnose and rectify faults in complex refrigeration/air conditioning systems	2.3.5 Refrigeration system controls
	2.3.6 Air conditioning system controls
	2.17.13 Refrigeration system analysis
	2.2.3 Fault finding techniques
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ013A Commission refrigeration and air conditioning systems	2.2 Enterprise communication methods
	2.11.10.2 Air conditioning testing devices
	2.15.30 Commissioning refrigeration and air conditioning systems
	2.16.17 Retrofitting refrigeration systems
	2.17.3 Refrigeration systems and compressor operations
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ014A Solve problems in hydronic systems	2.17.6 Hydronic systems
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ015A Solve problems in	2.17.7 Beverage dispensers

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
beverage dispensers	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ016A Solve problems in transport refrigeration systems	2.17.8 Transport refrigeration systems
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ017A Solve problems in Ultra-low temperature refrigeration systems	2.17.9 Ultra-low temperature refrigeration systems
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ018A Solve problems in post mix refrigeration systems	2.17.10.1 Post mix refrigeration systems
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ019A Solve problems in ice making systems	2.17.11 Ice making systems
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ020A Solve problems in industrial refrigeration systems	2.17.12 Industrial refrigeration systems
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ021A Monitor and adjust energy management systems on refrigeration systems	2.15.16 Energy management systems for commercial refrigeration
	2.18.1 Occupational Health and Safety principles
UEENEEJ022A Diagnose faults in complex refrigeration or HVAC control systems	2.15.17 Refrigeration/HVAC direct digital controls
	2.15.18 Refrigeration/HVAC pneumatic controls
	2.18.1 Occupational Health and Safety principles
UEENEEJ023A Commission complex heating, ventilation and air conditioning (HVAC) systems	2.15.19 HVAC air systems
	2.16.9 Commissioning – HVAC system
	2.18.1 Occupational Health and Safety principles
UEENEEJ024A Commission hydronic systems for refrigeration and/or air conditioning	2.15.20 HVAC hydronic systems
	2.16.9 Commissioning – HVAC system
	2.18.1 Occupational Health and Safety principles
UEENEEJ025A Commission complex	2.16.9 Commissioning – HVAC system

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
refrigeration systems	2.16.10 Commissioning commercial/industrial refrigeration systems
	2.18.1 Occupational Health and Safety principles
UEENEEJ026A Commission complex control systems for refrigeration/air conditioning	2.15.21 Refrigeration/HVAC electronic controls
	2.16.9 Commissioning – HVAC system
	2.18.1 Occupational Health and Safety principles
UEENEEJ027A Determine thermodynamic parameters of refrigeration and air conditioning systems	2.17.14.1 Refrigeration engineering mathematics fundamentals
	2.17.15 Refrigeration science
	2.18.1 Occupational Health and Safety principles
UEENEEJ028A Produce HVAC/R drawings	2.16.11 Air conditioning drawing
	2.18.1 Occupational Health and Safety principles
UEENEEJ029A Determine the heat loads for commercial refrigeration and air conditioning applications	2.17.16 Heat load estimating of commercial refrigeration
	2.17.17.1 HVAC load estimating fundamentals
	2.18.1 Occupational Health and Safety principles
UEENEEJ030A Produce HVAC/R control system diagrams	2.15.15 HVAC control system fundamentals
	2.18.1 Occupational Health and Safety principles
UEENEEJ031A Provide solutions to vibration problems in HVAC/R system design	2.17.20 Materials strength fundamentals
	2.17.21.1 Noise and vibration control fundamentals
	2.18.1 Occupational health and safety principles
UEENEEJ032A Design commercial refrigeration systems	2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
	2.16.16 Refrigeration System Components and Piping
	2.17.22 Refrigeration and food storage technology
	2.18.1 Occupational health and safety principles
UEENEEJ033A Design industrial refrigeration systems	2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
	2.16.16 Refrigeration System Components and Piping
	2.17.22 Refrigeration and food storage technology
	2.17.23.1 Industrial refrigeration systems design fundamentals
	2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEJ034A Design heating, ventilation and air conditioning (HVAC) systems	2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
	2.16.16 Refrigeration System Components and Piping
	2.17.24 Commercial air conditioning systems design
	2.18.1 Occupational Health and Safety principles
UEENEEJ035A Design control systems for a heating, ventilation, air conditioning or refrigeration system	2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
	2.15.17 Refrigeration/HVAC direct digital controls
	2.15.18 Refrigeration/HVAC pneumatic controls
	2.18.1 Occupational Health and Safety principles
UEENEEJ036A Evaluate and report on energy management	2.16.12 Energy management
	2.16.13 Building management systems
	2.18.1 Occupational Health and Safety principles
UEENEEJ037A Evaluate and report on air quality in buildings	2.16.14 Management of indoor air quality
	2.18.1 Occupational Health and Safety principles
UEENEEJ038A Analyse noise and vibration in refrigeration and air conditioning systems	2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning
	2.17.18.2 Thermodynamics
	2.17.21.1 Noise and vibration parameters and requirements
	2.17.21.2 Advanced noise and vibration control
	2.17.25 Statics
	2.18.1 Occupational health and safety principles
UEENEEJ039A Develop specifications and prepare drawings for HVAC/R project	2.2.11.2 Specification development
	2.16.15 Computer aided drafting
	2.18.1 Occupational Health and Safety principles
UEENEEJ040A Manage refrigeration and air conditioning projects	2.2.17 Project management
	2.2.19 Customer/Client relations
	2.2.31 Refrigeration and air conditioning industry sector customs and practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEJ041A Design complex commercial refrigeration systems	2.17.26 Commercial refrigeration system design
	2.18.1 Occupational Health and Safety principles

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
UEENEEJ042A Design complex industrial refrigeration systems	2.17. 23.2 Industrial refrigeration system design
	2.18.1 Occupational Health and Safety principles
UEENEEJ043A Design complex air conditioning systems	2.17.17.2 HVAC load estimating
	2.17.27 Air conditioning system design
	2.17.28 Psychrometrics – advanced
	2.18.1 Occupational Health and Safety principles
UEENEEJ044A Design mechanical ventilation/exhaust systems	2.17.29 Exhaust systems design
	2.18.1 Occupational Health and Safety principles
UEENEEJ045A Design hydronic systems	2.15.20 HVAC hydronic systems
	2.17.30 Heating systems design
	2.17.31 Hydronic system design
	2.18.1 Occupational Health and Safety principles
UEENEEJ046A Design complex control systems for a heating, ventilation, air conditioning or refrigeration system	2.15.17 Refrigeration/HVAC direct digital controls
	2.15.18 Refrigeration/HVAC pneumatic controls
	2.18.1 Occupational Health and Safety principles
UEENEEJ047A Audit energy use for commercial HVAC/R systems	2.16.12.2 Energy management
	2.18.1 Occupational Health and Safety principles
UEENEEJ048A Audit HVAC/R control systems for compliance with standards and regulations	2.15.22 HVAC control systems
	2.16.5 Refrigeration and air conditioning installations, testing and verification methods
	2.16.13 Building management systems
	2.18.1 Occupational Health and Safety principles
UEENEEJ049A Develop specifications for heat exchanger design	2.17.18.2 Thermodynamics
	2.17.18.3 Heater exchanger designs
	2.18.1 Occupational Health and Safety principles
UEENEEJ050A Evaluate alternative and new technologies applicable to electrotechnology applications	2.17.32 Sources of technical development and processes for their adoption
	2.18.1 Occupational Health and Safety principles
UEENEEJ051A Service small appliances and power tools	2.6.25 Hand power tools repairs
	2.15.7 Small appliance repair
	2.18.1 Occupational Health and Safety principles
	2.18.13 Appliance servicing safe working practices
UEENEEJ052A Carry out repairs to appliance refrigeration systems	2.15.8 Appliance refrigeration systems
	2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.18.3.1 Refrigeration and air conditioning safe working practices
	2.18.13 Appliance servicing safe working practices
UEENEEJ053A Find and rectify faults in appliance motors and associated controls	2.6.1 Protection devices and applications
	2.6.26 Appliance motors and circuits
	2.11.5 Basic electrical testing and measuring devices and techniques
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ054A Find and rectify faults in appliance control devices and systems	2.3.15 Appliances, electronic controls and communications basics
	2.11.9.4 Appliance diagnostic tools
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
	2.18.13 Appliance servicing safe working practices
UEENEEJ055A Service refrigerated appliances	2.15.8 Domestic appliance principles
	2.15.9.1 Appliance refrigeration systems
	2.15.9.2 Capillary systems
	2.15.9.3 Retrofitting domestic refrigeration systems
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
	2.18.13 Appliance servicing safe working practices
UEENEEJ056A Service clothes washers and dryers	2.15.8 Domestic appliance principles
	2.15.10 Clothes washers and dryers
	2.18.1 Occupational health and safety principles
	2.18.13 Appliance servicing safe working practices
UEENEEJ057A Service electric heating appliances	2.6.27.1 Electric heating appliances
	2.18.1 Occupational health and safety principles
	2.18.13 Appliance servicing safe working practices
UEENEEJ058A Service dish washing machines	2.15.11 Dish washing machines
	2.18.1 Occupational health and safety principles
	2.18.13 Appliance servicing safe working practices

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
UEENEEJ059A Service gas appliances	2.15.12 Gas cooking appliances
	2.18.1 Occupational health and safety principles
	2.18.13 Appliance servicing safe working practices
UEENEEJ060A Service room air conditioners	2.15.13 Room air conditioners
	2.17.4 Air conditioning fundamentals
	2.18.1 Occupational health and safety principles
	2.18.3.2 Split air conditioning systems safe working practices
	2.18.13 Appliance servicing safe working practices
UEENEEJ061A Verify compliance and functionality of appliances	2.15.14 Appliance, testing and compliance verification methods
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
	2.18.13 Appliance servicing safe working practice
UEENEEJ062A Recover, pressure and leak test, evacuate and charge refrigerants appliance	2.16.7 High pressure refrigerant installation
	2.17.2.3 Appliance refrigerants
	2.17.3 Refrigeration systems and compressor operations
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ063A Analyse the psychrometric performance of HVAC/R systems	2.17.33 Refrigeration systems
	2.17.34 Air conditioning systems
	2.17.35 Applied psychrometrics
	2.18.1 Occupational Health and Safety principles
UEENEEJ064A Analyse the operation of HVAC/R systems	2.15.19 HVAC air systems
	2.15.20 HVAC hydronic systems
	2.16.16 Refrigeration System Components and Piping
	2.17.36 Ventilation systems
	2.18.1 Occupational Health and Safety principles
UEENEEJ065A Evaluate fluid and thermodynamic parameters of refrigeration systems	2.17.14.2 Refrigeration engineering advanced mathematics
	2.17.18.1 Thermodynamics fundamentals
	2.17.19 Fluid mechanics fundamentals

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
	2.18.1 Occupational Health and Safety principles
UEENEEJ066A Solve problems in dairy refrigeration systems	2.17.10.2 Dairy refrigeration systems
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ067A Solve problems in central plant air conditioning systems	2.17.5 Central plant air conditioning systems
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ068A Maintain microbial control of air and water systems	2.13.8 Scheduled maintenance processors
	2.15.23 Microbial control fundamentals
	2.18.1 Occupational Health and Safety Principles
UEENEEJ069A Plan Refrigeration and air conditioning projects	2.2.16.1 Project Planning
	2.2.18 Critical path and project analysis
	2.2.31 Refrigeration and air conditioning industry sector customs and practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEJ070A Diagnose and rectify faults in refrigeration and air conditioning control systems	2.2.1 Enterprise communication methods
	2.2.3 Fault finding techniques
	2.3.5 Refrigeration system controls
	2.3.6 Air conditioning system controls
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ071A Solve problems in refrigerated beverage vending cabinets	2.17.37 Beverage vending cabinets
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ072A Recover, pressure and leak test, evacuate and charge refrigerants – split air conditioning systems	2.11.9.1 Basic refrigeration testing and measuring field devices
	2.11.9.2 Fitting and removing refrigeration service gauges
	2.15.1 Refrigeration compressors

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
	2.15.2 Condensers
	2.15.3 Evaporators
	2.15.4.1 Refrigerant flow controls and distributors
	2.15.9.4 Split air conditioning system
	2.17.1.1 Refrigeration fundamentals
	2.17.1.2 Basic refrigeration system operating conditions
	2.17.2.2 Split air conditioning refrigerants
	2.18.1 Occupational Health and Safety principles
	2.18.3.1 Refrigeration and air conditioning safe working practices
UEENEEJ073A Service microwave ovens	2.6.27.2 Microwave ovens
	2.18.1 Occupational health and safety principles
	2.18.13 Appliance servicing safe working practices

## K – Renewable sustainable units

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEK001A Maintain safety and tidiness of remote area power supply (RAPS) systems	2.13.1 RAPS plant area cleaning
	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote area power supply safe working practices
UEENEEK002A Work safely in remote area power supply (RAPS) systems	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote area power supply safe working practices
UEENEEK003A Conduct periodic maintenance of remote area power supply (RAPS) battery banks	2.13.2 RAPS systems battery bank maintenance techniques
	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote area power supply safe working practices
UEENEEK004A Conduct periodic maintenance of remote area power supply (RAPS) generator sets	2.13.3 RAPS systems generator sets maintenance techniques
	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote area power supply safe working practices
UEENEEK005A Conduct periodic maintenance of remote area power supply (RAPS) photo voltaic arrays	2.13.4 RAPS systems photo voltaic array maintenance techniques
	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote Area Power Supply safe working practices
UEENEEK006A Conduct periodic maintenance of remote area power supply (RAPS) wind generators	2.13.5 RAPS systems wind generator maintenance techniques
	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote Area Power Supply safe working practices
UEENEEK007A Conduct checks in the demand side use of remote area power supplies	2.13.7 RAPS systems maintenance scheduling
	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote Area Power Supply safe working practices
UEENEEK008A Plan periodic maintenance schedules of remote area power supplies	2.13.1 RAPS plant area cleaning
	2.13.2 RAPS system battery bank maintenance techniques
	2.13.4 RAPS systems photo voltaic array maintenance techniques

	2.13.7 RAPS system maintenance scheduling
	2.13.8 Scheduled maintenance processors
	2.18.1 Occupational Health and Safety principles
	2.20.3 Introduction to renewable energy technologies
	2.20.5 Remote area essential services facilities
UEENEEK009A Attend to breakdowns in remote area power supplies	2.13.1 RAPS plant area cleaning
	2.13.2 RAPS system battery bank maintenance techniques
	2.13.4 RAPS systems photo voltaic array maintenance techniques
	2.18.1 Occupational Health and Safety principles
	2.20.3 Introduction to renewable energy technologies
	2.20.5 Remote area essential services facilities
UEENEEK010A Coordinate maintenance of renewable energy apparatus and systems	2.13.1 RAPS plant area cleaning
	2.13.2 RAPS system battery bank maintenance techniques
	2.13.4 RAPS systems photo voltaic array maintenance techniques
	2.18.1 Occupational Health and Safety principles
	2.20.3 Introduction to renewable energy technologies
	2.20.5 Remote area essential services facilities
UEENEEK011A Assemble and connect remote area power supplies (RAPS)	2.13.2 RAPS Systems battery bank maintenance techniques
	2.18.1 Occupational Health and Safety principles
	2.20.3 Introduction to renewable energy technologies
	2.20.5 Remote area essential services facilities
	2.20.6 Remote area essential services power plant
UEENEEK012A Provide basic sustainable energy solutions for energy reduction in domestic premises	2.8.1.2 Fundamental electrical principles
	2.8.2.1 Direct current circuit principles
	2.18.1 Occupational Health and Safety principles
	2.20.3 Introduction to renewable energy technologies
UEENEEK013A Apply sustainable energy practice in daily activities	2.18.1 Occupational Health and Safety principles
	2.20.3 Introduction to renewable energy technologies

	2.20.4 Greenhouse reduction strategies
UEENEEK014A Promote sustainable energy practice in the community	2.18.1 Occupational Health and Safety principles
	2.20.3 Introduction to renewable energy technologies
	2.20.4 Greenhouse reduction strategies
UEENEEK017A Maintain and repair facilities associated with remote area essential service operations	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote area power supply safe working practices
	2.20.5 Remote area essential services facilities
UEENEEK018A Maintain operation of remote area water facilities	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote area power supply safe working practices
	2.20.8 Remote area essential services water facilities
UEENEEK019A Maintain operation of remote area waste water facilities	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote area power supply safe working practices
	2.20.7 Remote area essential services waste water facilities
UEENEEK020A Maintain operation of remote area power plant	2.18.1 Occupational Health and Safety principles
	2.18.4 Remote area power supply safe working practices
	2.20.6 Remote area essential services power plant
UEENEEK021A Manage renewable energy projects	2.2.17 Project management
	2.2.19 Customer/Client relations
	2.2.32 Renewable energy industry sector customs and practices
	2.18.8.2 Occupational Health and Safety, enterprise responsibilities
UEENEEK022A Plan renewable energy projects	2.2.16.1 Project planning
	2.2.18.2 Critical path and project analysis
	2.2.32 Renewable energy industry sector customs and practices
	2.18.8.8 Occupational Health and Safety, enterprise responsibilities
UEENEEK023A Carry out basic repairs to renewable energy apparatus by replacement of components	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.20.3 Introduction to renewable energy technologies
UEENEEK024A Assemble and set up	2.5.5 Technical standards, regulations and codes for

photovoltaic apparatus in domestic dwellings	extra-low voltage work
	2.18.1 Occupational Health and Safety principles
	2.18.9 Electronic safe working practices
UEENEEK025A Solve basic problems in photovoltaic energy apparatus	2.20.13 Photovoltaic installations
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEK026A Install and set up grid connected photovoltaic power systems	2.20.14 Photovoltaic power systems
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEK027A Diagnose faults in renewable energy control systems	2.20.19 Grid connected inverters
	2.2.3 Fault finding techniques
	2.18.1 Occupational Health and Safety principles
UEENEEK028A Solve problems in stand-alone renewable energy systems	2.18.2 Electrical safe working practices
	2.20.15 Renewable energy system electronics
	2.20.9.1 Stand alone renewable energy system components
UEENEEK029A Design renewable energy heating systems	2.17.18.2 Thermodynamics
	2.18.1 Occupational Health and Safety principles
	2.20.18 Solar water heating systems
	2.20.20 Renewable energy heating
UEENEEK030A Solve problems in wind energy conversion systems	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.20.16.1 Fundamentals of wind energy conversion
UEENEEK031A Design wind energy conversion systems rated to 10 kW.	2.18.1 Occupational Health and Safety principles
	2.20.16.2 Wind energy conversion systems
UEENEEK032A Develop strategies to address sustainability issues	2.18.1 Occupational Health and Safety principles
	2.20.11 Sustainability and greenhouse reduction strategies
UEENEEK033A Design set up hybrid power systems	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.20.10 Hybrid Energy Systems
UEENEEK034A Reserved	Reserved
UEENEEK035A Design grid connected power supply systems	2.5.2.1 Technical standards, regulations and codes for general electrical installations
	2.5.12 Electricity distributors, supply requirements

	2.6.2.2 Electrical metering arrangements
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.20.19 Grid connected inverters
UEENEEK036A Reserved	Reserved
UEENEEK037A Install and set up micro-hydro systems	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.20.17.1 Micro-hydro systems installation and maintenance processes
UEENEEK038A Design micro-hydro systems	2.18.1 Occupational Health and Safety principles
	2.20.17.1 Micro-hydro systems installation and maintenance processes
	2.20.17.2 Micro-hydro systems
UEENEEK039A Design stand-alone renewable energy systems	2.18.1 Occupational Health and Safety principles
	2.20.9.2 Stand-alone renewable energy system design consideration
UEENEEK040A Develop engineering solution to renewable energy problems	2.17.18.1 Thermodynamics fundamentals
	2.18.1 Occupational Health and Safety principles
	2.20.21 Distributed generation
UEENEEK041A Develop strategies for effective energy reduction in buildings	2.16.13 Building management systems
	2.18.1 Occupational Health and Safety principles
	2.20.12 Energy efficient building design

**M – Hazardous areas units**

<b>Competency Standard Units (CSUs)</b>	<b>Essential Knowledge and Associated Skills Clause</b>
UEENEEM001A Report on the integrity of explosion-protected equipment in hazardous areas	2.18.6 Hazardous area safe working practices
	2.19.1 Hazardous areas and explosion-protection principles
	2.19.2 Explosion protected equipment
	2.19.23 Explosion-protection visual checks
UEENEEM002A Attend to breakdowns in hazardous areas	2.18.6 Hazardous area safe working practices
	2.19.1 Hazardous areas and explosion-protection principles
	2.19.2 Explosion-protected equipment
	2.19.3 Flameproof (Ex 'd') explosion-protection technique
	2.19.4 Increased safety (Ex 'e') explosion-protection technique
	2.19.5 Non-sparking (Ex 'n') explosion-protection technique
	2.19.6 Intrinsic safety (Ex 'i') explosion-protection technique
	2.19.7 Pressurization (Ex 'p') explosion-protection technique
	2.19.8 Explosion-protection techniques for dusts
2.19.9 Common characteristics of explosion-protection techniques	
UEENEEM003A Use and maintain the integrity of portable gas detection devices	2.18.6 Hazardous area safe working practices
	2.19.1 Hazardous areas and explosion-protection principles
	2.19.24 Gas detection-portable devices
UEENEEM004A Install explosion-protected equipment and wiring systems	2.18.6 Hazardous area safe working practices
	2.19.1 Hazardous areas and explosion-protection principles
	2.19.2 Explosion-protected equipment
	2.19.3 Flameproof (Ex 'd') explosion-protection technique
	2.19.4 Increased safety (Ex 'e') explosion-protection technique
	2.19.5 Non-sparking (Ex 'n') explosion-protection technique

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique
	2.19.7 Pressurization (Ex‘p’) explosion-protection technique
	2.19.8 Explosion-protection techniques for dusts
	2.19.9 Common characteristics of explosion-protection techniques
	2.19.10 Hazardous areas installation and maintenance requirements
	2.19.11 Hazardous areas cable termination techniques
UEENEEM005A Install and maintain integrity of fixed gas detection equipment	2.18.6 Hazardous area safe working practices
	2.19.1 Hazardous areas and explosion-protection principles
	2.19.2 Explosion-protected equipment
	2.19.3 Flameproof (Ex‘d’) explosion-protection technique
	2.19.4 Increased safety (Ex‘e’) explosion-protection technique
	2.19.5 Non-sparking (Ex‘n’) explosion-protection technique
	2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique
	2.19.7 Pressurization (Ex‘p’) explosion-protection technique
	2.19.8 Explosion-protection techniques for dusts
	2.19.9 Common characteristics of explosion-protection techniques
	2.19.10 Hazardous areas installation and maintenance requirements
	2.19.11 Hazardous areas cable termination techniques
	2.19.25 Gas detection-fixed equipment
UEENEEM006A Maintain equipment in hazardous areas	2.18.6 Hazardous area safe working practices
	2.19.1 Hazardous areas and explosion-protection principles
	2.19.2 Explosion-protected equipment
	2.19.3 Flameproof (Ex‘d’) explosion-protection technique

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.19.4 Increased safety (Ex 'e') explosion-protection technique 2.19.5 Non-sparking (Ex 'n') explosion-protection technique 2.19.6 Intrinsic safety (Ex 'i') explosion-protection technique 2.19.7 Pressurization (Ex 'p') explosion-protection technique 2.19.8 Explosion-protection techniques for dusts 2.19.9 Common characteristics of explosion-protection techniques 2.19.10 Hazardous areas installation and maintenance requirements 2.19.11 Hazardous areas cable termination techniques
UEENEEM007A Overhaul and repair explosion-protected equipment	2.19.1 Hazardous areas and explosion-protection principles 2.19.2 Explosion-protected equipment 2.19.3 Flameproof (Ex 'd') explosion-protection technique 2.19.4 Increased safety (Ex 'e') explosion-protection technique 2.19.5 Non-sparking (Ex 'n') explosion-protection technique 2.19.6 Intrinsic safety (Ex 'i') explosion-protection technique 2.19.7 Pressurization (Ex 'p') explosion-protection technique 2.19.8 Explosion-protection techniques for dusts 2.19.9 Common characteristics of explosion-protection techniques 2.19.13.1 Explosion-protected equipment overhaul and repair, general requirements 2.19.13.2 Overhaul and repair requirements specific to each explosion-protection technique
UEENEEM008A Assess explosion-protected equipment for compliance with Standards	2.19.1 Hazardous areas and explosion-protection principles 2.19.2 Explosion-protected equipment

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.19.3 Flameproof (Ex‘d’) explosion-protection technique
	2.19.4 Increased safety (Ex‘e’) explosion-protection technique
	2.19.5 Non-sparking (Ex‘n’) explosion-protection technique
	2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique
	2.19.7 Pressurization (Ex‘p’) explosion-protection technique
	2.19.8 Explosion-protection techniques for dusts
	2.19.9 Common characteristics of explosion-protection techniques
	2.19.21 Explosion-protected equipment conformity assessment
	UEENEEM009A Test installations in hazardous areas
2.19.1 Hazardous areas and explosion-protection principles	
2.19.2 Explosion-protected equipment	
2.19.3 Flameproof (Ex‘d’) explosion-protection technique	
2.19.4 Increased safety (Ex‘e’) explosion-protection technique	
2.19.5 Non-sparking (Ex‘n’) explosion-protection technique	
2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique	
2.19.7 Pressurization (Ex‘p’) explosion-protection technique	
2.19.8 Explosion-protection techniques for dusts	
2.19.9 Common characteristics of explosion-protection techniques	
2.19.10 Hazardous areas installation and maintenance requirements	
2.19.11 Hazardous areas cable termination techniques	
2.19.22 Hazardous areas installation testing	
UEENEEM010A Conduct close	2.18.6 Hazardous areas safe working practices

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
inspection of existing hazardous areas installations	2.19.1 Hazardous areas and explosion-protection principles
	2.19.2 Explosion-protected equipment
	2.19.3 Flameproof (Ex ‘d’) explosion-protection technique
	2.19.4 Increased safety (Ex ‘e’) explosion-protection technique
	2.19.5 Non-sparking (Ex ‘n’) explosion-protection technique
	2.19.6 Intrinsic safety (Ex ‘i’) explosion-protection technique
	2.19.7 Pressurization (Ex ‘p’) explosion-protection technique
	2.19.8 Explosion-protection techniques for dusts
	2.19.9 Common characteristics of explosion-protection techniques
	2.19.10 Hazardous areas installation and maintenance requirements
	2.19.18 Hazardous areas close inspection requirements
UEENEEM011A Conduct detailed inspection of hazardous areas installations	2.18.6 Hazardous areas safe working practices
	2.19.1 Hazardous areas and explosion-protection principles
	2.19.2 Explosion-protected equipment
	2.19.3 Flameproof (Ex ‘d’) explosion-protection technique
	2.19.4 Increased safety (Ex ‘e’) explosion-protection technique
	2.19.5 Non-sparking (Ex ‘n’) explosion-protection technique
	2.19.6 Intrinsic safety (Ex ‘i’) explosion-protection technique
	2.19.7 Pressurization (Ex ‘p’) explosion-protection technique
	2.19.8 Explosion-protection techniques for dusts
	2.19.9 Common characteristics of explosion-protection techniques
	2.19.10 Hazardous areas installation and maintenance requirements

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.19.12 Hazardous areas detailed inspection techniques
	2.19.18 Hazardous areas close inspection requirements
UEENEEM012A Develop and manage maintenance programs for hazardous areas electrical equipment	2.19.1 Hazardous areas and explosion-protection principles
	2.19.2 Explosion-protected equipment
	2.19.3 Flameproof (Ex‘d’) explosion-protection technique
	2.19.4 Increased safety (Ex‘e’) explosion-protection technique
	2.19.5 Non-sparking (Ex‘n’) explosion-protection technique
	2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique
	2.19.7 Pressurization (Ex‘p’) explosion-protection technique
	2.19.8 Explosion-protection techniques for dusts
	2.19.9 Common characteristics of explosion-protection techniques
	2.19.10 Hazardous areas installation and maintenance requirements
	2.19.19 Hazardous areas management
UEENEEM013A Ensure the safety of hazardous areas	2.19.1 Hazardous areas and explosion-protection principles
	2.19.19 Hazardous areas management
UEENEEM014A Design and develop modifications to explosion-protected equipment	2.19.1 Hazardous areas and explosion-protection principles
	2.19.2 Explosion-protected equipment
	2.19.3 Flameproof (Ex‘d’) explosion-protection technique
	2.19.4 Increased safety (Ex‘e’) explosion-protection technique
	2.19.5 Non-sparking (Ex‘n’) explosion-protection technique
	2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique
	2.19.7 Pressurization (Ex‘p’) explosion-protection technique

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.19.8 Explosion-protection techniques for dusts 2.19.9 Common characteristics of explosion-protection techniques 2.19.13.1 Explosion-protected equipment overhaul and repair, general requirements 2.19.13.2 Overhaul and repair requirements specific to each explosion-protection technique 2.19.14.1 Explosion-protected equipment modification, general requirements 2.19.14.2 Modification requirements specific to each explosion-protection technique
UEENEEM015A Classify hazardous areas	2.19.1 Hazardous areas and explosion-protection principles 2.19.17 Hazardous areas classification techniques
UEENEEM016A Design electrical installations in hazardous areas	2.19.1 Hazardous areas and explosion-protection principles 2.19.2 Explosion-protected equipment 2.19.3 Flameproof (Ex ‘d’) explosion-protection technique 2.19.4 Increased safety (Ex ‘e’) explosion-protection technique 2.19.5 Non-sparking (Ex ‘n’) explosion-protection technique 2.19.6 Intrinsic safety (Ex ‘i’) explosion-protection technique 2.19.7 Pressurization (Ex ‘p’) explosion-protection technique 2.19.8 Explosion-protection techniques for dusts 2.19.9 Common characteristics of explosion-protection techniques 2.19.10 Hazardous areas installation and maintenance requirements 2.19.15 Hazardous areas installation planning 2.19.16 Common classified hazardous areas
UEENEEM017A Design explosion-protected electrical systems	2.19.1 Hazardous areas and explosion-protection principles 2.19.2 Explosion-protected equipment 2.19.3 Flameproof (Ex ‘d’) explosion-protection technique

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.19.4 Increased safety (Ex‘e’) explosion-protection technique
	2.19.5 Non-sparking (Ex‘n’) explosion-protection technique
	2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique
	2.19.7 Pressurization (Ex‘p’) explosion-protection technique
	2.19.8 Explosion-protection techniques for dusts
	2.19.9 Common characteristics of explosion-protection techniques
	2.19.10 Hazardous areas installation and maintenance requirements
	2.19.15 Hazardous areas installation planning
	2.19.16 Common classified hazardous areas
	2.19.20 Explosion-protected electrical systems design
	2.19.25 Gas detection-fixed equipment
UEENEEM018A Design gas detection systems	2.19.1 Hazardous areas and explosion-protection principles
	2.19.2 Explosion-protected equipment
	2.19.3 Flameproof (Ex‘d’) explosion-protection technique
	2.19.4 Increased safety (Ex‘e’) explosion-protection technique
	2.19.5 Non-sparking (Ex‘n’) explosion-protection technique
	2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique
	2.19.7 Pressurization (Ex‘p’) explosion-protection technique
	2.19.8 Explosion-protection techniques for dusts
	2.19.9 Common characteristics of explosion-protection techniques
	2.19.10 Hazardous areas installation and maintenance requirements
	2.19.15 Hazardous areas installation planning
2.19.16 Common classified hazardous areas	

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.19.20 Explosion-protected electrical systems design
	2.19.26 Evaluation and selection of gas detection equipment (portable and fixed)

## N – Rail signalling units

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEN001A Service mechanical signalling equipment and infrastructure	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.5.11 Environmental and heritage awareness
	2.14.1 Basic rail operations
	2.14.2.2 Rail signalling principles, mechanical
	2.14.3 Rail signalling, mechanical equipment
	2.14.5 Rail signalling, point actuators devices
	2.14.11.2 Rail signalling, interlocking systems, Mechanical
	2.14.13 Rail signalling, electro-pneumatic equipment
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN002A Assemble and wire internal electrical signalling equipment	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.9.3.2 Inverters
	2.14.6 Rail signalling, electronic equipment
	2.14.7 Rail signalling, computer-based equipment
	2.14.9 Rail signalling, train detection
	2.14.10 Rail signalling, remote control systems
	2.14.11.1 Rail signalling, interlocking systems, Electrical
	2.14.12 Rail signalling, power supplies
	2.14.13 Rail signalling, electro-pneumatic equipment
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEN003A Install and maintain track circuit leads and bonds	2.18.5 Rail safe working practices
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.5.11 Environmental and heritage awareness
	2.14.1 Basic rail operations
	2.14.9 Rail signalling, train detection
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
UEENEEN004A Perform cable system tests	2.18.5 Rail safe working practices
	2.2.2 Enterprise work activities records
	2.4.16 Personal computers, engineering applications software basic
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.5.11 Environmental and heritage awareness
	2.11.8 Data and voice cabling testing devices
	2.14.1 Basic rail operations
	2.14.9 Rail signalling, train detection
	2.14.12 Rail signalling, power supplies
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
UEENEEN005A Install and maintain signalling power supplies	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
	2.2.2 Enterprise work activities records
	2.4.16 Personal computers, engineering applications software basic
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.9.3.3 Electronic switching

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.9.3.2 Inverters
	2.9.11 Linear and switch mode power supplies
	2.14.12 Rail signalling, power supplies
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN006A Maintain remote control and non-vital interlocking control systems	2.2.2 Enterprise work activities records
	2.3.13 Using supervisory control and data acquisition systems
	2.4.11 Personal computers, hardware structure
	2.4.13 Computer peripherals
	2.4.16 Personal computers, engineering applications software basic
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.9.3.2 Inverters
	2.9.3.3 Electronic switching
	2.9.11 Linear and switch mode power supplies
	2.10.1.1 Electronic communications, principles
	2.14.6 Rail signalling, electronic equipment
	2.14.8 Rail signalling, computer applications
	2.14.10 Rail signalling, remote control systems
	2.14.12 Rail signalling, power supplies
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN007A Maintain power signalling and protected level crossing equipment	2.2.2 Enterprise work activities records
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.5.11 Environmental and heritage awareness 2.10.1.1 Electronic communications, principles 2.14.1 Basic rail operations 2.14.3 Rail signalling, mechanical equipment 2.14.4 Rail signalling, electrical equipment 2.14.5 Rail signalling, point actuators devices 2.14.9 Rail signalling, train detection 2.14.14 Rail signalling, drawings and diagrams 2.14.15 Rail signalling, regulations and codes 2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices 2.18.5 Rail safe working practices
UEENEEN008A Maintain on-site power operated point-activating devices	2.2.2 Enterprise work activities records 2.3.13 Using supervisory control and data acquisition systems 2.5.4 Technical standards, regulations and codes rail networks 2.5.10 Technical manuals and catalogues 2.5.11 Environmental and heritage awareness 2.14.1 Basic rail operations 2.14.3 Rail signalling, mechanical equipment 2.14.4 Rail signalling, electrical equipment 2.14.5 Rail signalling, point actuators devices 2.14.13 Rail signalling, electro-pneumatic equipment 2.14.14 Rail signalling, drawings and diagrams 2.14.15 Rail signalling, regulations and codes 2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices 2.18.5 Rail safe working practices
UEENEEN009A Maintain track circuit equipment	2.2.2 Enterprise work activities records 2.3.13 Using supervisory control and data acquisition systems 2.4.16 Personal computers, engineering applications software basic

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.14.1 Basic rail operations
	2.14.9 Rail signalling, train detection
	2.14.12 Rail signalling, power supplies
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN010A Maintain electronic signalling and communication systems	2.2.2 Enterprise work activities records
	2.3.13 Using supervisory control and data acquisition systems
	2.4.11 Personal computers, hardware structure
	2.4.16 Personal computers, engineering applications software basic
	2.4.13 Computer peripherals
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.9.3.3 Electronic switching
	2.9.3.2 Inverters
	2.9.11 Linear and switch mode power supplies
	2.10.1.1 Electronic communications, principles
	2.14.1 Basic rail operations
	2.14.4 Rail signalling, electrical equipment
	2.14.6 Rail signalling, electronic equipment
	2.14.7 Rail signalling, computer-based equipment
	2.14.8 Rail signalling, computer applications
	2.14.9 Rail signalling, train detection
	2.14.10 Rail signalling, remote control systems
	2.14.11.1 Rail signalling, interlocking systems, electrical

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.14.11.2 Rail signalling interlocking systems, mechanical 2.14.12 Rail signalling, power supplies 2.14.14 Rail signalling, drawings and diagrams 2.14.15 Rail signalling, regulations and codes 2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices 2.18.5 Rail safe working practices
UEENEEN011A Install and maintain power operated signalling equipment	2.2.2 Enterprise work activities records 2.3.13 Using supervisory control and data acquisition systems 2.5.4 Technical standards, regulations and codes rail networks 2.5.10 Technical manuals and catalogues 2.5.11 Environmental and heritage awareness 2.14.1 Basic rail operations 2.14.2.1 Rail signalling principles, electrical 2.14.3 Rail signalling, mechanical equipment 2.14.4 Rail signalling, electrical equipment 2.14.5 Rail signalling, point actuators devices 2.14.7 Rail signalling, computer-based equipment 2.14.13 Rail signalling, electro-pneumatic equipment 2.14.14 Rail signalling, drawings and diagrams 2.14.15 Rail signalling, regulations and codes 2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices 2.18.5 Rail safe working practices
UEENEEN012A Maintain power signalling and protective relay interlocking systems	2.2.2 Enterprise work activities records 2.3.13 Using supervisory control and data acquisition systems 2.4.16 Personal computers, engineering applications software basic 2.5.4 Technical standards, regulations and codes rail networks 2.5.10 Technical manuals and catalogues

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.14.1 Basic rail operations
	2.14.2.1 Rail signalling principles, electrical
	2.14.4 Rail signalling, electrical equipment
	2.14.11 Rail signalling, interlocking systems, electrical
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN013A Install and test computer based interlocking equipment	2.2.2 Enterprise work activities records
	2.4.13 Computer peripherals
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.5.11 Environmental and heritage awareness
	2.9.3.3 Electronic switching
	2.9.3.2 Inverters
	2.9.11 Linear and switch mode power supplies
	2.10.1 Electronic communications, principles
	2.14.1 Basic rail operations
	2.14.6 Rail signalling, electronic equipment
	2.14.7 Rail signalling, computer-based equipment
	2.14.8 Rail signalling, computer applications
	2.14.10 Rail signalling, remote control systems
	2.14.11.1 Rail signalling, interlocking systems, electrical
	2.14.11.2 Rail signalling interlocking systems, mechanical
	2.14.12 Rail signalling, power supplies
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
2.18.2 Electrical safe working practices	
2.18.5 Rail safe working practices	

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEN014A Maintain computer based and solid state interlocking systems	2.2.2 Enterprise work activities records
	2.3.13 Using supervisory control and data acquisition systems
	2.4.11 Personal computers, hardware structure
	2.4.13 Computer peripherals
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.9.3.3 Electronic switching
	2.9.3.2 Inverters
	2.9.11 Linear and switch mode power supplies
	2.10.1.1 Electronic communications, principles
	2.14.1 Basic rail operations
	2.14.6 Rail signalling, electronic equipment
	2.14.7 Rail signalling, computer-based equipment
	2.14.8 Rail signalling, computer applications
	2.14.10 Rail signalling, remote control systems
	2.14.11 Rail signalling, interlocking systems, electrical
	2.14.12 Rail signalling, power supplies
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
2.18.2 Electrical safe working practices	
2.18.5 Rail safe working practices	
UEENEEN015A Conduct routine inspection and testing of new signal cables and lines	2.2.2 Enterprise work activities records
	2.4.16 Personal computers, engineering applications software basic
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.5.11 Environmental and heritage awareness
	2.11.8 Data and voice cabling testing and testing devices
	2.14.4 Rail signalling, electrical equipment

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.14.5 Rail signalling, point actuators devices
	2.14.6 Rail signalling, electronic equipment
	2.14.7 Rail signalling, computer-based equipment
	2.14.8 Rail signalling, computer applications
	2.14.9 Rail signalling, train detection
	2.14.10 Rail signalling, remote control systems
	2.14.11 Rail signalling, interlocking systems, electrical
	2.14.12 Rail signalling, power supplies
	2.14.13 Rail signalling, electro-pneumatic equipment
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN016A Maintain electronic switched and microprocessor-based remote control systems	2.2.2 Enterprise work activities records
	2.3.13 Using supervisory control and data acquisition systems
	2.4.11 Personal computers, hardware structure
	2.4.16 Personal computers, engineering applications software basic
	2.4.13 Computer peripherals
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.9.3.3 Electronic switching
	2.9.3.2 Inverters
	2.9.11 Linear and switch mode power supplies
	2.10.1.1 Electronic communications, principles
	2.14.6 Rail signalling, electronic equipment
	2.14.8 Rail signalling, computer applications
	2.14.10 Rail signalling, remote control systems
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN017A Install and maintain transmission interface equipment	2.2.2 Enterprise work activities records
	2.3.13 Using supervisory control and data acquisition systems
	2.4.11 Personal computers, hardware structure
	2.4.16 Personal computers, engineering applications software basic
	2.4.13 Computer peripherals
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.10.1.1 Electronic communications, principles
	2.14.6 Rail signalling, electronic equipment
	2.14.7 Rail signalling, computer-based equipment
	2.14.8 Rail signalling, computer applications
	2.14.10 Rail signalling, remote control systems
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN018A Find and repair wiring system faults	2.2.2 Enterprise work activities records
	2.4.16 Personal computers, engineering applications software basic
	2.4.13 Computer peripherals
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.5.11 Environmental and heritage awareness
	2.9.3.2 Inverters
	2.9.3.3 Electronic switching
	2.9.11 Linear and switch mode power supplies
	2.10.1.1 Electronic communications, principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.11.8 Data and voice cabling testing and testing devices 2.14.6 Rail signalling, electronic equipment 2.14.7 Rail signalling, computer-based equipment 2.14.8 Rail signalling, computer applications 2.14.10 Rail signalling, remote control systems 2.14.11.1 Rail signalling, interlocking systems, electrical 2.14.11.2 Rail signalling interlocking systems, mechanical 2.14.12 Rail signalling, power supplies 2.14.14 Rail signalling, drawings and diagrams 2.14.15 Rail signalling, regulations and codes 2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices 2.18.5 Rail safe working practices
UEENEEN019A Test and isolate faults	2.2.2 Enterprise work activities records 2.4.11 Personal computers, hardware structure 2.4.16 Personal computers, engineering applications software basic 2.4.13 Computer peripherals 2.5.4 Technical standards, regulations and codes rail networks 2.5.10 Technical manuals and catalogues 2.5.11 Environmental and heritage awareness 2.9.3.2 Inverters 2.9.3.3 Electronic switching 2.9.11 Linear and switch mode power supplies 2.10.1.1 Electronic communications, principles 2.14.1 Basic rail operations 2.14.2.2 Rail signalling principles, mechanical

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.14.3 Rail signalling, mechanical equipment 2.14.5 Rail signalling, point actuators devices 2.14.6 Rail signalling, electronic equipment 2.14.7 Rail signalling, computer-based equipment 2.14.8 Rail signalling, computer applications 2.14.11.2 Rail signalling, interlocking systems, mechanical 2.14.13 Rail signalling, electro-pneumatic equipment 2.14.14 Rail signalling, drawings and diagrams 2.14.15 Rail signalling, regulations and codes 2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices 2.18.5 Rail safe working practices
UEENEEN020A Install electrical power and control equipment for rail networks	2.2.2 Enterprise work activities records 2.4.16 Personal computers, engineering applications software basic 2.5.4 Technical standards, regulations and codes rail networks 2.5.10 Technical manuals and catalogues 2.9.3.2 Inverters 2.9.3.3 Electronic switching 2.9.11 Linear and switch mode power supplies 2.14.12 Rail signalling, power supplies 2.14.13 Rail signalling, electro-pneumatic equipment 2.14.14 Rail signalling, drawings and diagrams 2.14.15 Rail signalling, regulations and codes 2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices 2.18.5 Rail safe working practices
UEENEEN021A	Reserved

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEN022A	Reserved
UEENEEN023A	Reserved
UEENEEN024A	Reserved
UEENEEN025A Coordinate and manage track protection	2.5.4 Technical standards, regulations and codes rail networks
	2.5.11 Environmental and heritage awareness
	2.14.1 Basic rail operations
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN026A Develop maintenance programmes	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.5.11 Environmental and heritage awareness
	2.14.1 Basic rail operations
	2.14.2.2 Rail signalling principles, mechanical
	2.14.3 Rail signalling, mechanical equipment
	2.14.5 Rail signalling, point actuators devices
	2.14.11.2 Rail signalling, interlocking systems, Mechanical
	2.14.13 Rail signalling, electro-pneumatic equipment
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN027A Decommission electrical and electro-mechanical signalling from service	2.2.2 Enterprise work activities records
	2.4.11 Personal computers, hardware structure
	2.4.16 Personal computers, engineering applications software basic
	2.4.13 Computer peripherals

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.5.4 Technical standards, regulations and codes rail networks
	2.5.10 Technical manuals and catalogues
	2.9.3.2 Inverters
	2.9.3.3 Electronic switching
	2.9.11 Linear and switch mode power supplies
	2.10.1.1 Electronic communications, principles
	2.14.6 Rail signalling, electronic equipment
	2.14.7 Rail signalling, computer-based equipment
	2.14.8 Rail signalling, computer applications
	2.14.10 Rail signalling, remote control systems
	2.14.11.1 Rail signalling interlocking systems, electrical
	2.14.11.2 Rail signalling interlocking systems, mechanical
	2.14.12 Rail signalling, power supplies
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices
UEENEEN028A Test and commission Power Signalling Equipment	2.2.2 Enterprise work activities records
	2.4.11 Personal computers, hardware structure
	2.4.13 Computer peripherals
	2.4.16 Personal computers, engineering applications software basic
	2.5.4 Technical standards, regulations and codes rail networks

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.5.10 Technical manuals and catalogues
	2.9.3.2 Inverters
	2.9.3.3 Electronic switching
	2.9.11 Linear and switch mode power supplies
	2.10.1.1 Electronic communications, principles
	2.14.6 Rail signalling, electronic equipment
	2.14.7 Rail signalling, computer-based equipment
	2.14.8 Rail signalling, computer applications
	2.14.10 Rail signalling, remote control systems
	2.14.11.1 Rail signalling interlocking systems, electrical
	2.14.11.2 Rail signalling interlocking systems, mechanical
	2.14.12 Rail signalling, power supplies
	2.14.14 Rail signalling, drawings and diagrams
	2.14.15 Rail signalling, regulations and codes
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.18.5 Rail safe working practices

**P – Restricted and specialist electrical work units**

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEEP001A Disconnect and reconnect fixed wired electrical equipment connected to a Low Voltage supply	2.1.5.1 Power cable and conductor terminations
	2.2.2 Enterprise work activities records
	2.5.1.2 Drawings and diagrams
	2.8.1.1 Basic electrical principles
	2.8.8 Electrotechnology science and materials
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.19.29 Disconnect/Reconnect
	2.19.39 Produce Status Reports using established procedures
UEENEEP002A Attach cords and plugs to electrical equipment for connection to a single phase 250 Volt supply	2.8.1.1 Basic electrical principles
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.19.30 Flexible cords and plugs to 250V
	2.19.36 Fault find to 250 V – General Appliances
	2.19.39 Produce Status Reports using established procedures
UEENEEP003A Attach cords and plugs to electrical equipment for connection to 1000 Va.c. or 1500 Vd.c. supply	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.19.31 Flexible cords/cables to 1000 V
	2.19.39 Produce Status Reports using established procedures
UEENEEP004A Disconnect and reconnect explosion-protected electrical equipment connected to Low Voltage supply	2.18.1 Occupational Health and Safety principles
	2.18.6 Hazardous area safe working practices
	2.19.1 Hazardous area and explosion protection principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.19.2 Explosion-Protected equipment 2.19.11 Hazardous areas cable termination techniques 2.19.39 Produce Status Reports using established procedures
UEENEPP005A Disconnect and reconnect 3.3 kV electric propulsion components of self-propelled earth moving vehicles	2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices 2.19.32 Disconnect and reconnect HV electric propulsion components 2.19.39 Produce Status Reports using established procedures
UEENEPP006A Attach flexible cables and plugs to electrical equipment connected to a high voltage supply	2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices 2.19.33 High voltage flexible cables and plugs exceeding 1000 V 2.19.39 Produce Status Reports using established procedures
UEENEPP007A Locate and rectify faults in electrical low voltage equipment following prescribed procedures – <i>General single phase motors, composite equipment, and/or control devices</i>	2.18.1 Occupational Health and Safety principles 2.18.13 Appliance servicing working practices 2.19.36 Fault find to 250 V – General Appliances 2.19.39 Produce Status Reports using established procedures
UEENEPP007A Locate and rectify faults in electrical low voltage equipment following prescribed procedures – <i>Multi phase motor endorsements, composite equipment, and/or control devices</i>	2.18.1 Occupational Health and Safety principles 2.18.2 Electrical safe working practices 2.19.34 Fault find to 250 V - Motors 2.19.37 Fault find to 1000 V - Motors 2.19.39 Produce Status Reports using established procedures
UEENEPP007A Locate and rectify	2.18.1 Occupational Health and Safety principles

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
faults in electrical low voltage equipment following prescribed procedures – <i>Water heater endorsements</i>	2.18.2 Electrical safe working practices
	2.19.35 Fault find to 250 V – Water heaters
	2.19.38 Fault find to 1000 V – Water heaters
	2.19.39 Produce Status Reports using established procedures
UEENEEP008A Conduct in-service safety testing of electrical cord assemblies and cord connected equipment	2.5.2.3 Technical standards, regulations and codes for testing and tagging portable and cord connected electrical apparatus
	2.6.1 Protection devices and applications
	2.8.1.1 Basic electrical principles
	2.11.5 Basic electrical testing and measuring devices and techniques
	2.11.15 Portable apparatus testing (PAT) devices
	2.18.1 Occupational Health and Safety principles
	2.18.2 Electrical safe working practices
	2.19.39 Produce Status Reports using established procedures

## R – Research units

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
UEENEER001A Contribute to the planning of a research project	2.2.16.1 Project planning
	2.2.17 Project management
	2.2.25 Research concepts
	2.2.33 Working in a team
	2.2.34 Scientific writing and communication
	2.2.35 Data collection techniques
	2.2.36 Data analysis and presentation
	2.2.37 Product development and trials
	2.2.38 Intellectual property concepts
	2.2.39 Commercialisation concepts
	2.18.1 Occupational Health and Safety principles
UEENEER002A Contribute to the conduct of a research project	2.2.17 Project management
	2.2.25 Research concepts
	2.2.33 Working in a team
	2.2.34 Scientific writing and communication
	2.2.35 Data collection techniques
	2.2.36 Data analysis and presentation
	2.2.37 Product development and trials
	2.2.38 Intellectual property concepts
	2.18.1 Occupational Health and Safety principles
UEENEER003A Contribute to the development of a Product/Application/Service	2.2.17 Project management
	2.2.25 Research concepts
	2.2.33 Working in a team
	2.2.34 Scientific writing and communication

Competency Standard Units (CSUs)	Essential Knowledge and Associated Skills Clause
	2.2.35 Data collection techniques
	2.2.36 Data analysis and presentation
	2.2.37 Product development and trials
	2.2.38 Intellectual property concepts
	2.18.1 Occupational Health and Safety principles
UEENEER004A Contribute to the trial of a Product/Application/Service	2.2.17 Project management
	2.2.25 Research concepts
	2.2.33 Working in a team
	2.2.34 Scientific writing and communication
	2.2.35 Data collection techniques
	2.2.36 Data analysis and presentation
	2.2.37 Product development and trials
	2.2.38 Intellectual property concepts
	2.18.1 Occupational Health and Safety principles
UEENEER005A Contribute to Intellectual Property Management	2.2.17 Project management
	2.2.33 Working in a team
	2.2.38 Intellectual property concepts
	2.18.1 Occupational Health and Safety principles
UEENEER006A Contribute to the commercialisation of products/applications/ services	2.2.33 Working in a team
	2.2.38 Intellectual property concepts
	2.2.39 Commercialisation concepts
	2.18.1 Occupational Health and Safety principles

## Map 2 – Essential Knowledge and Associated Skills to Unit Relationship

### 2.1 – Cables, conductors and terminations

Essential Knowledge and Associated Skills Clause	Competency Standard Units (CSUs)
2.1.1 Cable protection and support	E008A; E022A; F002A; F003A; G007A;
2.1.2 Cable types and applications	E008A; F002A; G007A;
2.1.3 Cables in buildings, structures and premises	E008A; F002A; G003A; G004A; G007A; I007;
2.1.4 Basic cable and conductor terminations	E008A; G011A; H002A; H070A; I001A; I007; I019A;
2.1.5.1 Power cable and conductor terminations	A013A; G003A; G004A; P001A;
2.1.5.2 Bus bar techniques	A012A;
2.1.6.1 Telecommunication cable and conductor terminations	F002A;
2.1.6.2 Telecommunication aerial cabling	F012A;
2.1.6.3 Telecommunication below ground cabling	F013A;
2.1.7.1 Performance (copper) data cable installation and terminations	D017A; F004A; F010A;
2.1.7.2 Coaxial cable installation and terminations	D017A; F010A; H008A;
2.1.7.3 Optical fibre cabling installation and terminations	D017A; F005A; F010A;
2.1.7.4 Specialist audio/video cabling installation and termination	H010A;
2.1.8 Electronic cable and conductor terminations	H001A; H002A; H003A; H004A; H070A; I007; I008;
2.1.9 Winding wire types and connections	G051A;
2.1.10 High voltage motor winding, conductors, connections methods and insulation	G055A; G056A;
2.1.11 Integrated cabling arrangements	E021A;

**2.2 – Common, commercial, processes and enterprise specific knowledge and skills**

<b>Essential Knowledge and Associated Skills Clause</b>	<b>Competency Standard Units (CSUs)</b>
2.2.1 Enterprise communication methods	C001A; C002A; C003A; C008A; C009A; C010A; C012A; E020A; E024A; E032A; E033A; E034A; E035A; E036A; E037A; E051A; G007A; G008A; G009A; G032A; H003A; H009A; J010A; J070A;
2.2.2 Enterprise work activities records	C001A;C002A; C003A; C008A; C009A; C010A; C012A; E020A; E024A; E032A; E033A; E034A; E035A; E036A; E037A; E051A; F008A; F010A; G007A; G008A; G009A; G022A; G032A; G062A; N004A; N005A; N006A; N007A; N008A; N009A; N010A; N011A; N012A; N013A; N014A; N015A; N016A; N017A; N018A; N019A; N020A; N027A; N028A; P001A;
2.2.3 Fault finding techniques	G008A; G009A; G015A; H065A; I014A; J012A; J070A; K027A;
2.2.4 Problem solving techniques	C010A; E014A; E051A; G062A; H065A;
2.2.5 Enterprise customer relations protocols	C003A; C009A; C010A; C012A; E015A; E020A; E051A; G022A; G062A; H009A;
2.2.6 Enterprise quality management system, basics	A004A; A006A; C010A; C012A; E014A; E016A;
2.2.7 Enterprise purchasing system	C002A; E016A;
2.2.8 Enterprise costing methods	C003A; C009A;
2.2.9 Enterprise stock control methods	C008A; E051A;
2.2.10 Job costing techniques	C003A; C009A; E016A;
2.2.11.1 Estimating techniques	C005A; C007A;
2.2.11.2 Specification development	C004A; E016A; E070A; E071A; E072A; E073A; E074A; E075A; E077A; J039A;
2.2.12 Tendering requirements	C006A;

<b>Essential Knowledge and Associated Skills Clause</b>	<b>Competency Standard Units (CSUs)</b>
2.2.13 User instruction techniques	C010A; E020A;
2.2.14 Contracts, format, responsibilities and obligations	C007A;
2.2.15 Risk management, application and techniques	E011A; E016A;
2.2.16.1 Project Planning	D048A; E013A; G070A; H060A; 1035A; 1037A; J069A; R001A;
2.2.16.2 Project development	None
2.2.17 Project management	D047A; E012A; G069A; H041; 1034A; 1036A; J040A; K021A; R001A; R002A; R003A; R004A; R005A;
2.2.18 Critical path and project analysis	D048A; E013A; E015A; E016A; G070A; H060A; 1035A; 1037A; J069A;
2.2.19 Customer/Client relations	D047A; E012A; E014A; E016A; E070A; E071A; E072A; E073A; E074A; E075A; E077A; G069A; H041A; 1034A; 1036A; J040A; K021A;
2.2.20 Computer use basics	C001A; C002A; C008A; D001A; E016A; E024A; E044A; E070A; E071A; E072A; E073A; E074A; E075A; E077A;
2.2.21 Engineering analysis, decision making and reporting	E024A;
2.2.22 Enterprise work/business coverage	C012A;
2.2.23 Enterprise regulatory requirements and non regulatory standards	G014A;
2.2.24 Technical examination and testing methods	H047;
2.2.25 Research Concepts	E016A; E024A; E070A; E071A; E072A; E073A; E074A; E075A; E077A; R001A; R002A; R003A; R004A;
2.2.26 Automated systems industry sector customs and practices	1036A; 1037A;
2.2.27 Computer industry sector customs and practices	D047A; D048A;
2.2.28 Electrical industry sector customs and practices	G069A; G070A;
2.2.29 Electronic systems industry sector customs and practices	H041; H060A;

<b>Essential Knowledge and Associated Skills Clause</b>	<b>Competency Standard Units (CSUs)</b>
2.2.30 Control systems industry sector customs and practices	1034A; 1035A;
2.2.31 Refrigeration and air conditioning industry sector customs and practices	J040A; J069A;
2.2.32 Renewable energy industry sector customs and practices	K021A; K022A;
2.2.33 Working in a Team	E024A; R001A; R002A; R003A; R004A; R005A; R006A;
2.2.34 Scientific Writing and Communication	R001A; R002A; R003A;R004A;
2.2.35 Data Collection Techniques	E024A; R001A; R002A; R003A; R004A;
2.2.36 Data Analysis and Presentation	E024A; R001A; R002A; R003A; R004A;
2.2.37 Product Development and Trials	R001A; R002A; R003A; R004A;
2.2.38 Intellectual Property Concepts	R001A; R002A; R003A; R004A; R005A; R006A;
2.2.39 Commercialisation Concepts	R001A; R006A;
2.2.40 Electrotechnology Industry organisations and practices	E040A; E041A; E042A; E043A; E044A; E045A; E047A; E048A; E049A;
2.2.41 Supervision fundamentals	E014A;
2.2.42 Business Concepts	None
2.2.43 Commissioning processes and procedures	G062A;
2.2.44 Requirements and methods for maintaining currency in industry developments	E006A;
2.2.45 Responsibilities under a competency development plan	C013A;C014A; C015A; C016A; C017A; C018A; C019A; C020A; C021A; C022A; C023A; C024A; C025A; C026A; C027AA; C028A; C029A; E038A;
2.2.46 Methods of monitoring and reporting competency development activities	C013A;C014A; C015A; C016A; C017A; C018A; C019A; C020A; C021A; C022A; C023A; C024A; C025A; C026A; C027AA; C028A; C029A; E038A;
2.2.49 Procedure and protocols for giving evidence in a court of law	G072A;

## 2.3 – Control technologies

Essential Knowledge and Associated Skills	Competency Standard Units
2.3.1 Electrical control devices	A013A; G007A; G008A; G009A; G028A;
2.3.2 Control circuit fundamentals	A013A; G008A; G009A; G052A;
2.3.3 Process control principles	D052A; I006A; I014A;
2.3.4 Pneumatic/hydraulic control tubing/piping	I001A; I007; I008; I019A;
2.3.5 Refrigeration system controls	J012A; J070A;
2.3.6 Air conditioning system controls	J012A; J070A;
2.3.7 Smart device basics	D005A;
2.3.8 Programmable controller basics	D007A;
2.3.9 PLC programming basics	D007A;
2.3.10.1 PLC programming	D007A;
2.3.10.2 PLC high level programming	D009A;
2.3.10.3 PLC system applications	D026A;
2.3.11 Control system network basics	D025A; D034A;
2.3.12 Control network infrastructure	D026A; D034A;
2.3.13 Using supervisory control and data acquisition systems	N006A; N008A; N009A; N010A; N011A; N012A; N014A; N016A; N017A;
2.3.14 Supervisory control and data acquisition systems programming	D008A;
2.3.15 Appliances, electronic controls and communications basics	J054A;
2.3.16 Integrated systems basics	D031A;
2.3.17 Integrated systems, subsystem interworking	D032A;
2.3.18 Complex integrated system programming	D033A;
2.3.19 Control programming fundamentals	D026A; D027A;
2.3.20 Microcontroller programming basics	D028A; D050A;
2.3.21 Complex control systems	I023A;

## 2.4 – Communications and computer technologies

Essential Knowledge and Associated Skills	Competency Standard Units
2.4.1.1 Telecommunications CPR regulations and installations	F001A;
2.4.1.2 Telephone system fundamentals	F002A; F008A; F010A; H033A;
2.4.1.3 Telephone network facilities	H033A;
2.4.1.4 Lift telecommunications cabling regulations and installation	F003A;
2.4.2.1 Telecommunication earthing and protection	F002A; F010A; H033A;
2.4.3.1 Data communication fundamentals	F014A;
2.4.3.2 Networking fundamentals	D012A; D017A; F008A; F009A; F010A; F011A; H083A;
2.4.4 Wireless networks infrastructure	H083A;
2.4.5 Wide area networks infrastructure	None
2.4.6 PABX fundamentals	F010A; H033A;
2.4.7 PABX programming	H033A;
2.4.8 Switches, hubs and routers	F010A; H033A;
2.4.9 Decoders	F010A; H033A;
2.4.10 (Reserved)	Reserved
2.4.11 Personal computers, hardware structure	D002A; E044A; H001A; N006A; N010A; N014A; N016A; N017A; N019A; N027A; N028A;
2.4.12.1 Computer hardware sub-assemblies	D002A;
2.4.12.2 Multimedia computer components	D030A;
2.4.13 Computer peripherals	D012A; N006A; N010A; N013A; N014A; N016A; N017A; N018A; N019A; N027A; N028A;
2.4.14 Personal computer operating systems, basics	D002A; D043A;
2.4.15 Computer operating systems	D012A; D013A; D043A;
2.4.16 Personal computers, engineering applications software basic	D004A; N004A; N005A; N006A; N009A; N010A; N012A; N015A; N016A; N017A; N018A; N019A; N020A; N027A; N028A;

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.4.17 Servers	None
2.4.18 Business equipment software basics	H003A;
2.4.19 Gaming equipment communications	H020A;
2.4.20 Programming elements	D010A;
2.4.21 Client Side programming	D010A; D029A;
2.4.22 Server scripting	D010A; D029A;
2.4.23 Database access	D010A;
2.4.24 Web applications and services	D010A;
2.4.25.1 Local area network fundamentals	D046A;
2.4.25.2 Network services design processes	D014A;
2.4.26 Network services management processes	D014A;
2.4.27.1 Unix fundamentals	D013A; D015A;
2.4.27.2 Linux fundamentals	D013A;
2.4.27.3 Mac OSX fundamentals	D013A;
2.4.28 Network operating systems essentials	D015A;
2.4.29 Network operating systems implementation	D015A;
2.4.30 Network infrastructure	D016A; D025A;
2.4.31 Directory Services	D016A;
2.4.32 Operating systems and networks fundamentals	D024A;
2.4.33 Operating systems and networks	D024A;
2.4.34 Routing methods and protocols	D019A;
2.4.35 Networks, remote access	D020A;
2.4.36 Multi-layer switched networks	D021A;
2.4.37 Fundamentals of network security	D022A;
2.4.38 Fundamentals of wireless security	D023A; H083A;
2.4.39 Internet, network basics	D017A;
2.4.40 Internet, network routing	D017A;
2.4.41 Internet, local area networking	D018A;
2.4.42 Internet, wide area networking	D018A;
2.4.43.1 Object orientated programming basics	D003A;
2.4.43.2 Object orientated programming	D011A;
2.4.44.1 Microprocessor/microcontroller assembler language programming	D050A;

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.4.44.2 High level programming	D050A; D051A;
2.4.44.3 Advanced high-level programming	D051A;
2.4.45 Copier/printer software functions and configuration	H021A;
2.4.46 Security systems basic software functions and configuration	H052A;
2.4.47 Security systems programming methods	H053A;
2.4.48 Security systems alarms programming	H054A;
2.4.49.1 Security systems access control programming	H055A;
2.4.49.2 Security systems closed circuit television programming	H056A;
2.4.50.1 Integrated security systems	H058A;
2.4.50.2 Internetworking security systems	H059A;
2.4.51 Fire protection systems programming methods	H063A;

## 2.5 – Drawings, diagrams, schedules, manuals, standards and regulations

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.5.1.1 Drawings interpretation and sketching	E042A; E043A;E044A; E047A; E049A;
2.5.1.2 Drawings and diagrams	E007A; G007A; P001A;
2.5.2.1 Technical standards, regulations and codes for general electrical installations	E021A; G003A; G004A; G007A; G008A; G014A; G071A; K035A;
2.5.2.2 Technical standards, regulations and codes for special electrical installations	G007A; G014A; G020A; G021A; G024A;
2.5.2.3 Technical standards, regulations and codes for testing and tagging portable and cord connected electrical apparatus	P008A;
2.5.3 Technical standards, regulations and codes for lifts and escalators	G016A;
2.5.4 Technical standards, regulations and codes rail networks	N001A; N002A; N003A; N004A; N005A; N006A; N007A; N008A; N009A; N010A; N011A; N012A; N013A; N014A; N015A; N016A; N017A; N018A; N019A; N020A; N025A; N026A; N027A; N028A;
2.5.5 Technical standards, regulations and codes for extra-low voltage work	E008A; H006A; H010A; H035A; H036A; K024A;
2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning	J006A; J007A; J008A; J010A; J032A; J033A; J034A; J035A; J038A
2.5.7 Technical standards, regulations and codes for telecommunications cabling	D017A; E021A; F002A;
2.5.8 Technical standards, regulations and codes for electronic apparatus	H047;
2.5.9 Building codes for applicable to general electrotechnology installations	E021A;
2.5.10 Technical manuals and catalogues	G007A; G008A; H007A; H017A; H019A; H024A; I006A; I013A; N001A; N002A; N003A; N004A; N005A; N006A; N007A; N008A; N009A; N010A; N011A; N012A; N013A; N014A; N015A; N016A; N017A; N018A; N019A; N020A; N026A;

	N027A; N028A;
2.5.11 Environmental and heritage awareness	E008A; F002A; F003A; G003A; G004A; G007A; H035A; H036A; H050A; N001A; N003A; N004A; N007A; N008A; N011A; N013A; N015A; N018A; N019A; N025A; N026A;
2.5.12 Electricity distributors, supply requirements	G014A; G022A; G027A; G071A; K035A;
2.5.13 Electricity regulatory safety requirements	G014A; G022A;
2.5.14 Technical standards, regulations and codes applicable to instrumentation and control	I001A; I006A; I007; I008; I013A; I019A;
2.5.15 Measurement standards applicable to process instrumentation	I013A;
2.5.16 Measurement standards applicable to scientific instruments	I017A;
2.5.17 Regulatory requirements for the generation, transmission and distribution of electricity	None
2.5.18 Regulatory requirements and codes of practice for the gaming equipment	H009A;
2.5.19 Technical standards, regulations and codes for mining	G018A;
2.5.20 Technical standards, regulations and codes for security systems	H050A;
2.5.21 Technical standards, regulations and codes for fire protection and warning systems	H061A; H062A;
2.5.22 Performance standards and regulatory requirements for the electrical rotating machine	G060A;
2.5.23 Performance standards and regulatory requirements for electrical equipment	G031A;

## 2.6 – Electrical applications and apparatus

Essential Knowledge and Associated Skills	Competency Standard Units
2.6.1 Protection devices and applications	G007A; G028A; J053A; P008A;
2.6.2.1 Switchboards/distribution boards	G007A; G028A;
2.6.2.2 Electrical metering arrangements	G025A; G028A; G071A; K035A;
2.6.2.3 Interval metering concepts and applications	G071A;
2.6.3 Single phase alternators	G026A;
2.6.4 Three phase alternators	G026A;
2.6.5 Single phase motors	None
2.6.6.1 Three phase motors	None
2.6.6.2 Alternating Current Rotating Machines	A010A; G003A; G008A; G052A;
2.6.7 Single phase transformers	None
2.6.8.1 Three phase transformers	None
2.6.8.2 Single and Three-Phase Transformers	A013A; G003A; G008A; G053A;
2.6.8.3 Power transformers diagnostics	G040A;
2.6.9.1 Lighting fundamentals	G008A;
2.6.9.2 Luminaires and lighting systems	G003A; G008A;
2.6.9.3 Venue lighting for audio/video/live presentations	H036A;
2.6.10 Electric Heating	G008A;
2.6.11 Direct current motor fundamentals	None
2.6.12 Direct current machines	G010A;
2.6.13 Motor starters and overload protection basics	None
2.6.14 Direct-on-line (DOL) motor starters	None
2.6.15 Reduced voltage a.c. motor starters	None
2.6.16 Direct current motor control	G010A;
2.6.17 Cells and batteries	G013A; G019A;
2.6.18 RAPS systems basics	Covered by 2.13 and 2.20 Clauses
2.6.19 RAPS systems demand side management	
2.6.20 Electrical mining systems overview	G018A;
2.6.21 Electricity supply and reticulation	G015A;
2.6.22.1 Electrical power system protection	G015A;

2.6.22.2 Electrical power system operations	G037A;
2.6.22.3 Electrical power system transmission faults	G042A;
2.6.22.4 Distributive generation systems	G039A;
2.6.22.5 Electrical power system protection diagnostic	G046A;
2.6.22.6 Electrical power distribution systems diagnostic	G038A;
2.6.23 Marine Electrical Systems overview	G019A;
2.6.24.1 Switchgear/controlgear	A010A; G028A; G029A;
2.6.24.2 Control panel wiring	A013A; G028A;
2.6.25 Hand power tools repairs	J051A;
2.6.26 Appliance motors and circuits	J053A;
2.6.27.1 Electric heating appliances	J057A;
2.6.27.2 Microwave ovens	J073A;
2.6.28 Motor windings	G053A; G054A; G061A;
2.6.29 Coil winding basics	G050A;
2.6.30 Coil testing	G050A;
2.6.31.1 Electrical machine winding basic	G051A; G052A;
2.6.31.2 Low voltage three phase motor winding techniques	G053A;
2.6.31.3 Direct current motor winding techniques	G054A;
2.6.31.4 High voltage three phase motor winding techniques	G055A; G056A;
2.6.31.5 Electrical machines, mechanical components	G059A; G064A;
2.6.31.6 Electrical machines, performance monitoring	G060A;
2.6.32 Field power and distribution systems	G026A;
2.6.33 Variable speed drives for a.c. motors	G035A;
2.6.34 Variable speed drives for d.c. motors	G036A;
2.6.35 Servomechanism systems	G041A;
2.6.36 Synchronous machine diagnostics	G043A;
2.6.37 Induction motors diagnostics	G045A;
2.6.38 Direct current machines diagnostics	G044A;
2.6.39 Lubrication of lift components	G065A; G066A;
2.6.40 Lift systems, roping	G065A;
2.6.41 Lift systems, rope inspection	G065A;
2.6.42 Escalators, moving walk and tread way mechanics	G066A;
2.6.43 Lift systems, plumbing and setting out	G067A;
2.6.44 Lift equipment alignment techniques	G067A;
2.6.45 Lift components – electrical/electronics.	G068A;

2.6.46 Lift systems – basic operations	G016A;
2.6.47 Lift components – electro-mechanical	G016A;
2.6.48 Electric lifts – mechanics	G016A;
2.6.49 Electro - hydraulic lifts	G016A;
2.6.50 Electro-hydraulic lifts – mechanical operation	G016A;
2.6.51 Emergency release procedures – trapped passengers	G016A;

## 2.7 – Electrical installations and systems

Essential Knowledge and Associated Skills	Competency Standard Units
2.7.1.1 Electrotechnology, building systems and materials	E047A;
2.7.1.2 Electrical installations, wiring and accessories	G003A; G004A; G007A; G008A;
2.7.1.3 Electrical Wiring Systems	G003A; G004A; G007A;
2.7.2 Electrical installations, equipment requirements	G003A; G004A; G007A; G017A;
2.7.3 Electrical installations, safety principles and requirements	G007A; G025A;
2.7.4.1 Electrical Installations, Protection Methods and Devices	A013A; G007A; G008A; G029A; G057A;
2.7.4.2 Electrical installations, circuit arrangements and cable selection	E021A; G007A; G008A; G025A;
2.7.4.3 Electrical installations, advanced methods of cable and protection selection	G027A;
2.7.5.1 Electrical installations, testing and verification	G005A; G027A;
2.7.5.2 Electrical installations, testing and verification of special installations	G021A; G027A;
2.7.5.3 Fire protection installations, testing and verification methods	H062A;
2.7.6 Electrical installations, emergency systems	G013A;
2.7.7 Electrical installations, special installation requirements	None
2.7.8 Electrical installations, hazardous areas	Covered by 2.19 Clauses
2.7.9.1 Electrical installations, single phase inspections	G022A;
2.7.9.2 Electrical installations, inspections and safety compliance audits	G023A;
2.7.10 Electrical installations, determination of demand	G027A;
2.7.11 Electrical installations, overcurrent protection	G027A;
2.7.12 Electrical installations, overvoltage and undervoltage protection	G027A;
2.7.13 Electrical installations, programmable logic controller requirements	D007A;
2.7.14 Procedures and processes for responding to reported electrical incidents	G072A;
2.7.15 Causes and consequence of unsafe and misuse of electrical installations and equipment	G072A;



## 2.8 – Electrical principles

Essential Knowledge and Associated Skills	Competency Standard Units
2.8.1.1 Basic electrical principles	P001A; P002A; P008A;
2.8.1.2 Fundamental electrical principles	E003A; E040A; E041A; E042A; E043A; E044A; E045A; E047A; E048A; E049A; K012A;
2.8.1.3 Electrotechnical principles	E029A;
2.8.2.1 Direct current circuit principles	E004A; E040A; E042A; E043A; E044A; E045A; E047A; E048A; E049A; K012A;
2.8.2.2 Alternating current principles - power	E019A; G002A; G012A; G030A;
2.8.3 Power factor	None
2.8.4 Three phase circuits	None
2.8.5 Magnetism	None
2.8.6 Electromagnetic principles	E019A; G001A; G008A; G012A;
2.8.7 Harmonic fundamentals	None
2.8.8 Electrotechnology science and materials	E047A; E049A; G012A; G030A; P001A;
2.8.9.1 Circuit analysis	E025A;
2.8.9.2 Electrical power circuit analysis	G048A;
2.8.9.3 Polyphase power circuit analysis	G049A;
2.8.10.1 Engineering maths fundamentals	E026A;
2.8.10.2 Engineering maths	E026A; G061A;
2.8.10.3 Advanced engineering maths	E027A;
2.8.10.4 Engineering Mathematics with Calculus	H084A;
2.8.11 Power engineering computations	G047A;
2.8.12 Electrical concepts and applications	None
2.8.13 Parts and component selection	E040A; E041A; E042A; E043A; E044A; E045A; E047A; E049A;
2.8.14.1 Electrotechnology calculations	None
2.8.14.2 Electrotechnology science	None
2.8.14.3 Electrotechnology Numeracy Diagnostic Assessment Methods	E030A;
2.8.14.4 Electrotechnology Literacy Diagnostic Assessment Methods	E030A;
2.8.15.1 Applied mathematical concepts	E045A; E050A;

2.8.15.2 Applied physics concepts	E046A;
2.8.15.3 Fault current calculations	G030A;

## 2.9 – Electronic principles and applications

Essential Knowledge and Associated Skills	Competency Standard Units
2.9.1.1 Electronic component basics	A002A; H002A; H070A;
2.9.1.2 Electronic component parameters and selection methods	H081A;
2.9.1.3 Single phase rectifiers	None
2.9.1.4 Frequency dependant circuit principles	H014A;
2.9.1.5 Basic electronic principles	E023A;
2.9.1.6 Basic digital principles	E023A;
2.9.2 Multiphase rectifiers	None
2.9.3.1 Voltage regulators	None
2.9.3.2 Inverters	N002A; N005A; N006A; N010A; N013A; N014A; N016A; N018A; N019A; N020A; N027A; N028A;
2.9.3.3 Electronic switching	N005A; N006A; N010A; N013A; N014A; N016A; N018A; N019A; N020A; N027A; N028A;
2.9.4.1 Digital electronic fundamentals	None
2.9.4.2 Digital signal processing	D052A; H084A;
2.9.4.3 Digital signal processing development	D052A; H084A;
2.9.4.4 Digital applications	H048;
2.9.5.1 Microprocessor fundamentals	D028A; H015A;
2.9.5.2 Microcontroller fundamentals	D028A; H066A;
2.9.6 Operational amplifiers	None
2.9.7.1 Single phase power control	H025A;
2.9.7.2 Polyphase power control	H026A;
2.9.8 Amplifier Fundamentals	H039A; H044A;
2.9.9.1 Advanced amplifiers	H013A; H044A;
2.9.9.2 Amplifier applications	H013A; H044; H072A;
2.9.9.3 Microwave amplifiers	H016A;
2.9.10 Reserved	Reserved
2.9.11 Linear and switch mode power supplies	H038; N005A; N006A; N010A; N013A; N014A; N016A; N018A; N019A; N020A; N027A; N028A;

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.9.12 Electronic fault finding	H011A; H012A; H015A; H016A; H039; H043; H066A;
2.9.13 Measurement circuits and applications	I021A;
2.9.14 Fundamentals of calibration	I017A;
2.9.15 Audio and video component functional controls	H004A; H024A;
2.9.16.1 Sound reproduction fundamentals	H006A; H010A; H073A;
2.9.16.2 Acoustics, spatial treatment and sound reproduction	H035A; H036A; H049A;
2.9.17.1 Audio reproduction, electronic components	H006A; H010A; H024A; H049A; H073A;
2.9.17.2 Audio component repair basics	H024A;
2.9.18 Audio reproduction, speaker fundamentals	H006A; H010A;
2.9.19 Audio/video recording and replay components repair basics	H006A; H010A; H017A;
2.9.20 Business equipment operational functions	Covered by 2.9.72/73
2.9.21 Business equipment components	
2.9.22 Gaming machine systems and equipment overview	H009A;
2.9.23.1 Gaming machine equipment adjustment and maintenance	H009A;
2.9.23.2 Gaming machine fault finding	H020A;
2.9.24 Cathode ray tube displays	H076A;
2.9.25 Plasma displays	H076A;
2.9.26.1 Liquid crystal displays	H076A;
2.9.26.2 Display circuit diagnostics	H076A;
2.9.27 Digital versatile disc (DVD) and compact disc (CD)	H017A;
2.9.28 Hand held remote control units	H022A;
2.9.29 Television scanning and deflection	H019A; H071A;
2.9.30 Television chrominance and luminance	H019A; H071A;
2.9.31.1 Television and video reception	None
2.9.31.2 Power supplies for TVs and VCRs	H071A;
2.9.31.3 Television RF Stages	H071A;
2.9.32.1 Camcorders and digital cameras	H078A;
2.9.32.2 Camera circuits diagnostics	H078A;
2.9.33 Video cassette recorder	None
2.9.34.1 Digital Television Receivers	H079A;

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.9.34.2 Digital television principles	H079A;
2.9.34.3 Advanced digital television principles	H080A;
2.9.35 Micro computer systems	None
2.9.36 Fire detection and warning system and apparatus fundamentals	H061A; H062A;
2.9.37 Fire alarm routine testing	H062A;
2.9.38 Tape recorders	None
2.9.39 AM and FM tuners	H072A;
2.9.40 Integrated audio systems	H035A;
2.9.41.1 Security systems installation basics	H050A;
2.9.41.2 Security systems installation faults	H075A;
2.9.42 Audio and video system set up	H004A;
2.9.43 Video systems installation	H006A;
2.9.44 Consumer video equipment	None
2.9.45.1 Audio electronics	H073A;
2.9.45.2 Recording and replay apparatus diagnostics	H077A;
2.9.46 Professional audio electronics	H010A;
2.9.47 Loud speakers and microphones	H010A;
2.9.48 Digital audio	H017A;
2.9.49 Computer monitors	None
2.9.50 Commercial audio/video systems commissioning process	H037A;
2.9.51 Camcorders	H074A;
2.9.52 Digital versatile disk processors	H017A; H074A;
2.9.53 Compact disk players	H017A; H074A;
2.9.54 VCR basic principles	H074A;
2.9.55 VCR fault finding	H074A;
2.9.56 VCR advanced principles	H074A;
2.9.57.1 Introduction to television	H019A;
2.9.57.2 Television receiver repair basics	H019A;
2.9.58 TV RF signal stages	None
2.9.59 Closed circuit televisions	H051A;
2.9.60 Electronic security systems fundamentals	Covered in 2.9.41.1
2.9.61 Advanced electronic security systems	H051A;

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.9.62 Security video monitoring and recording	None
2.9.63 Direct current power supplies	H011A;
2.9.64 Application of electronic devices	None
2.9.65 Regulated power supplies	None
2.9.66 Switching power supplies	None
2.9.67 Feedback filters and oscillators	H042A;
2.9.68 Filters and resonance	None
2.9.69 Digital subsystems	None
2.9.70 Automatic data capture	H018A;
2.9.71.1 Biometric devices	D053A; H051A;
2.9.71.2 Biometrics Equipment Techniques and Applications	D054A; D055A;
2.9.71.3 Biometric Systems Techniques and Applications	D054A; D055A;
2.9.71.4 Biometrics and Security	D055A;
2.9.72 Custom electronic installations, testing and verification methods	H005A;
2.9.73 Operational concepts of business machines	H003A;
2.9.74.1 Electro-mechanics of business machines	H003A;
2.9.74.2 Business machine transducers	H021A;
2.9.74.3 Photocopiers operating principles	None
2.9.75.1 High volume business machine functions and faults	H021A;
2.9.75.2 Colour photocopiers operating principles	H021A;
2.9.75.3 Facsimile machine operating principles	H021A;
2.9.76 Microwave heating	H023A;
2.9.77 Electronic components and system, industrial applications	G008A; H018A;
2.9.78 Common security scenarios and solutions	H057A;
2.9.79.1 Fire protection technologies	H061A; H062A;
2.9.79.2 Fire protection systems, commissioning process	H064A;
2.9.79.3 Fire protection systems faults	H065A;
2.9.80 Video and display set up	H010A; H035A;
2.9.81 Audio/video control equipment	H006A; H010A; H035A;
2.9.82 Introduction to optics	None
2.9.83 General electronic apparatus repair basics	H007A;
2.9.84 Advanced analogue electronics	H045A;

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.9.85 Advanced power amplifiers	H045A;
2.9.86 Audio system advance diagnostic techniques	H049A;
2.9.87 Photonic principles and applications	E028A;
2.9.88 Principles of Signal Conditioning	H085A;
2.9.89 Analogue Integrated Circuits	H085A;
2.9.90 RF Amplifiers	H082A;
2.9.91 Printed circuit board design techniques	H081A;

**2.10 – Electronic communications technology**

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.10.1.1 Electronic communications, principles	H046A; N006A; N007A; N010A; N014A; N016A; N017A; N018A; N019A; N027A; N028A;
2.10.1.2 Electronic signals and systems	D051A;
2.10.1.3 Electronic communications, technologies	None
2.10.2 Electronic communications, transmission principles	None
2.10.3 Electronic communications, modulation	None
2.10.4 Electronic communications, modulation circuits	H072A;
2.10.5 Electronic communications, receivers	H072A;
2.10.6 Electronic communications, transmitters	H072A;
2.10.7 Electronic communications, digital techniques	H083A;
2.10.8 Electronic communications, transmission lines	None
2.10.9 Electronic communications, antennas and wave propagation	H027A;
2.10.10 Electronic communications, microwave	None
2.10.11 Electronic communications, satellite	H027A; H030A;
2.10.12 Electronic communications, optical methods	None
2.10.13 Television and video reception	None
2.10.14 TV antenna systems	H008A;
2.10.15 Antenna installation and servicing	H008A;
2.10.16 Transmission lines and antennae	None
2.10.17 Electronic communications, multiplexing and de multiplexing	None
2.10.18 Electronic communications, microwave antennas and wave guide fundamentals	H028A;
2.10.19 Electronic communications, commissioning process	H027A;
2.10.20 Electronic communications, sonar Transducers and arrays	H040A;
2.10.21 Electronic communications, sonar system operating principles	H040A;
2.10.22 Electronic communications, sonar measurement and set up	H040A;
2.10.23 Electronic communications, secondary radar and related systems	H031A;

2.10.24 Electronic communications, radar and sonar displays devices	H031A; H040A;
2.10.25 Electronic communications, radar fundamentals	H031A;
2.10.26 Electronic communications, navigation systems	H029A;
2.10.27 Electronic communications, surveillance and observation	H030A;
2.10.28 Electronic communications, global positioning systems	H032A;
2.10.29 Digital television transmission towers and equipment	H080A;
2.10.30 Wireless devices	F007A;
2.10.31 Electrotechnology communications principles	F006A;
2.10.32 Amateur radio communication principles, practices, and technical overview	B001A;

## 2.11 – Equipment and tools

Essential Knowledge and Associated Skills	Competency Standard Units
2.11.1 Hand tools	E002A; E005A; E019A; E022A; E042A; E043A; E044A; E047A; E049A; G001A;
2.11.2.1 Power tools	E002A;E005A; E022A; E042A; E043A; E044A; E047A; E049A;
2.11.2.2 Electrical workshop machines	G011A; G064A;
2.11.3.1 Fixing and support devices and techniques	E005A; E022A; G007A;
2.11.3.2 Mobile plant, tools and equipment	None
2.11.4 Dismantling and assembling techniques	E002A; E042A; E043A; E044A; E047A; E049A;
2.11.5 Basic electrical testing and measuring devices and techniques	F011A; H070A; J053A; P008A;
2.11.6.1 Advance electrical testing and measuring devices	G032A; G072A;
2.11.6.2 Electrical field testing and measurement techniques	G032A; G072A;
2.11.6.3 Power cable fault detection techniques	G032A;
2.11.7.1 Electronic testing and measuring devices and techniques	H012A; H014A; H015A; H016A; H038A; H039; H043; H072A;
2.11.7.2 Advanced electronic testing and measuring devices and techniques	H011A; H013A; H015A; H031A; H040; H048; H049; H076A; H077A;
2.11.8 Data and voice cabling testing and testing devices	F004A; F005A; F011A; N004A; N015A; N018A;
2.11.9.1 Basic refrigeration testing and measuring field devices	J003A; J072A;
2.11.9.2 Fitting and removing refrigeration service gauges	J003A; J072A;
2.11.9.3 Replacement of basic components on a refrigeration system	J008A;
2.11.9.4 Appliance diagnostic tools	J054A;
2.11.10.1 Basic air conditioning measurement devices	J004A;
2.11.10.2 Air conditioning testing devices	J013A;
2.11.11.1 Electronic soldering equipment and techniques	H002A; H070A;
2.11.11.2 Surface mount soldering techniques	A001A;
2.11.11.3 Printed circuit board repair techniques	A004A;
2.11.11.4 Lead-free soldering technology	A006A;
2.11.12 Instrumentation testing and measuring field devices	I002A; I003A; I004A; I005A;

	I006A;
2.11.13.1 Brazing and soldering equipment and techniques	J002A;
2.11.13.2 Introduction to welding	E042A; E043A;
2.11.14 Piping and tubing techniques	J002A;
2.11.15 Portable apparatus testing (PAT) devices	P008A;
2.11.16 Electronic component place equipment	A003A;
2.11.17 Electronic assembly correction and rework techniques	None
2.11.18 Electronic assembly functional and quality testing	A005A;
2.11.19 Electrotechnology engineering practice	E042A; E043A;
2.11.20.1 Low voltage motor testing devices and techniques	G057A;
2.11.20.2 High voltage motor testing devices and techniques	G058A;
2.11.20.3 Electric motor mechanical measuring and testing devices and techniques	G059A;

## 2.12 – Instrumentation

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.12.1 Instrumentation principles	I001A;
2.12.2 Pressure	I002A;
2.12.3 Density and level	I003A;
2.12.4 Fluid flow	I004A;
2.12.5 Temperature	I005A;
2.12.6 Process control systems	I006A; I014A; I020A;
2.12.7 Control valve principles	I011A;
2.12.8 Control valve selection	I011A;
2.12.9 Actuators and positioners	I011A;
2.12.10 Transmitters and converters	I006A;
2.12.11.1 Industrial processes	I009A; I010A;
2.12.11.2 Process control, commissioning	I022A;
2.12.12 Distributive control principles (DCS)	I013A;
2.12.13 Instrumentation and control communications	I013A;
2.12.14 Indicators and methods of recording process data	I009A; I013A;
2.12.15 Gas analysis	I009A; I021A;
2.12.16 Water analysis	I009A; I021A;
2.12.17 Scientific analysis	I009A; I021A;
2.12.18 Weight measurement principles	I009A; I021A;
2.12.19 Instrument calibration methods	I009A;
2.12.20.1 Process equipment installation requirements and techniques	I013A;
2.12.20.2 Process control arrangements and equipment selection	I013A;
2.12.21 Control system installation, testing and verification methods	I012A;
2.12.22.1 Medical equipment principles	H034A; I015A;
2.12.22.2 Medical equipment, anatomy and physiology and infection control	H034A; I015A;
2.12.23 Transducers and sensing devices	I001A; I019A;
2.12.24 Calibration techniques	I017A;

**2.13 – Maintenance and repair**

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.13.1 RAPS plant area cleaning	K001A; K008A; K009A; K010A;
2.13.2 RAPS systems battery bank maintenance techniques	K003A; K008A; K009A; K010A; K011A;
2.13.3 RAPS systems generator sets maintenance techniques	K004A;
2.13.4 RAPS systems photo voltaic array maintenance techniques	K005A; K008A; K009A; K010A;
2.13.5 RAPS systems wind generator maintenance techniques	K006A;
2.13.6 RAPS system use auditing techniques	None
2.13.7 RAPS systems maintenance scheduling	K007A; K008A;
2.13.8 Scheduled maintenance processors	E009A; E010A; F004A; F005A; J068A; K008A;
2.13.9 Business equipment fundamentals	None
2.13.10 Cooling plant maintenance procedures	None

**2.14 – Rail signalling**

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.14.1 Basic rail operations	G017A; N001A; N003A; N004A; N007A; N008A; N009A; N010A; N011A; N012A; N013A; N014A; N019A; N025A; N026A;
2.14.2.1 Rail signalling principles, electrical	N011A; N012A;
2.14.2.2 Rail signalling principles, mechanical	N001A; N019A; N026A;
2.14.3 Rail signalling, mechanical equipment	N001A; N007A; N008A; N011A; N019A; N026A;
2.14.4 Rail signalling, electrical equipment	N007A; N008A; N010A; N011A; N012A; N015A;
2.14.5 Rail signalling, point actuating devices	N001A; N007A; N008A; N011A; N015A; N019A; N026A;
2.14.6 Rail signalling, electronic equipment	N002A; N006A; N010A; N013A; N014A; N015A; N016A; N017A; N018A; N019A; N027A; N028A;
2.14.7 Rail signalling, computer-based equipment	N002A; N010A; N011A; N013A; N014A; N015A; N017A; N018A; N019A; N027A; N028A;
2.14.8 Rail signalling, computer applications	N006A; N010A; N013A; N014A; N015A; N016A; N017A; N018A; N019A; N027A; N028A;
2.14.9 Rail signalling, train detection	N002A; N003A; N004A; N007A; N009A; N010A; N015A;
2.14.10 Rail signalling, remote control systems	N002A; N006A; N010A; N013A; N014A; N015A; N016A; N017A; N018A; N027A; N028A;
2.14.11.1 Rail signalling interlocking systems, Electrical	N002A; N010A; N013A; N018A; N027A; N028A;
2.14.11.2 Rail signalling interlocking systems, Mechanical	N001A; N010A; N013A; N018A; N019A; N026A; N027A; N028A;

Essential Knowledge and Associated Skills	Competency Standard Units
2.14.12 Rail signalling, power supplies	N002A; N004A; N005A; N006A; N009A; N010A; N013A; N014A; N015A; N018A; N020A; N027A; N028A;
2.14.13 Rail signalling, electro-pneumatic equipment	N001A; N002A; N008A; N011A; N015A; N019A; N020A; N026A;
2.14.14 Rail signalling, drawings and diagrams	N001A; N002A; N003A; N004A; N005A; N006A; N007A; N008A; N009A; N010A; N011A; N012A; N013A; N014A; N015A; N016A; N017A; N018A; N019A; N020A; N025A; N026A; N027A; N028A;
2.14.15 Rail signalling, regulations and codes	G017A; N001A; N002A; N003A; N004A; N005A; N006A; N007A; N008A; N009A; N010A; N011A; N012A; N013A; N014A; N015A; N016A; N017A; N018A; N019A; N020A; N025A; N026A; N027A; N028A;

## 2.15 – Refrigeration and air conditioning apparatus

Essential Knowledge and Associated Skills	Competency Standard Units
2.15.1 Refrigeration compressors	J003A; J072A;
2.15.2 Condensers	J003A; J072A;
2.15.3 Evaporators	J003A; J072A;
2.15.4 Refrigerant flow controls	None
2.15.5 Pumps	None
2.15.6 Fans and air distribution	J007A;
2.15.7 Small appliance repair	J051A;
2.15.8 Domestic appliance principles	J052A; J055A; J056A;
2.15.9.1 Appliance refrigeration systems.	J011A; J055A;
2.15.9.2 Capillary systems	J055A;
2.15.9.3 Retrofitting domestic refrigeration systems	J055A;
2.15.9.4 Split air conditioning system	J072A;
2.15.10 Clothes washers and dryers	J056A;
2.15.11 Dish washing machines	J058A;
2.15.12 Gas cooking appliances	J059A;
2.15.13 Room air conditioners	J060A;
2.15.14 Appliance, testing and compliance verification methods	J061A;
2.15.15 HVAC control systems fundamentals	J030A;
2.15.16 Energy management systems for commercial refrigeration	J021A;
2.15.17 Refrigeration/HVAC direct digital controls	J022A; J035A; J046A;
2.15.18 Refrigeration/HVAC pneumatic controls	J022A; J035A; J046A;
2.15.19 HVAC air systems	J023A; J064A;
2.15.20 HVAC hydronic systems	J024A; J045A; J064A;
2.15.21 Refrigeration/HVAC electronic controls	J026A;
2.15.22 HVAC control systems	J048A;
2.15.23 Microbial control fundamentals	J068A;
2.15.24 Cool rooms/freezer rooms	J007A;
2.15.25 Package air conditioning systems	J007A;
2.15.26 Merchandising and display cabinets	J007A;
2.15.27 Cooling towers, cooling towers, evaporative condensers, evaporative coolers and associated equipment	J007A;

2.15.28 Residential air conditioning	J007A;
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**2.16 – Refrigeration and air conditioning installations**

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.16.1 Refrigeration pipework and accessories	J006A; J010A;
2.16.2 Refrigeration pipework layout	J006A; J010A;
2.16.3 Refrigeration installations, equipment requirements	J006A; J010A;
2.16.4 Refrigeration pipe selection and sizing	J010A;
2.16.5 Refrigeration and air conditioning installations, testing and verification methods	J009A; J048A;
2.16.6 Split air conditioning system installation	J005A;
2.16.7 High pressure refrigerant installation	J062A;
2.16.8 Fault-finding and diagnostic techniques	Covered by 2.2.3
2.16.9 Commissioning – HVAC systems	J023A; J024A; J025A; J026A;
2.16.10 Commissioning Commercial/Industrial Refrigeration Systems	J025A;
2.16.11 Air conditioning drawing	J028A;
2.16.12.1 Energy management fundamentals	None
2.16.12.2 Energy management	J047A;
2.16.13 Building management systems	J036A; J048A; K041A;
2.16.14 Management of indoor air quality	J037A;
2.16.15 Computer aided drafting	J039A;
2.16.16 Refrigeration System Components and Piping	J032A; J033A; J034A; J064A;
2.16.17 Retro-fitting refrigeration systems	J013A;

**2.17 – Refrigeration and air conditioning principles and applications**

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.17.1.1 Refrigeration fundamentals	J003A; J072A;
2.17.1.2 Basic refrigeration system operating conditions	J003A; J072A;
2.17.2.1 Refrigerants	J008A;
2.17.2.2 Split air conditioning refrigerants	J072A;
2.17.2.3 Appliance refrigerants	J062A;
2.17.2.4 High pressure refrigerants	J008A;
2.17.3 Refrigeration systems and compressor operation	J013A; J062A;
2.17.4 Air conditioning fundamentals	J004A; J060A;
2.17.5 Central plant air conditioning systems	J067A;
2.17.6 Hydronic systems	J014A;
2.17.7 Beverage dispensers	J015A;
2.17.8 Transport refrigeration systems	J016A;
2.17.9 Ultra-low temperature refrigeration systems	J017A;
2.17.10.1 Post mix refrigeration systems	J018A;
2.17.10.2 Dairy refrigeration systems	J066A;
2.17.11 Ice making systems	J019A;
2.17.12 Industrial refrigeration systems	J020A;
2.17.13 Refrigeration system analysis	J012A;
2.17.14.1 Refrigeration engineering mathematics fundamentals	J027A;
2.17.14.2 Refrigeration engineering advanced mathematics	J065A;
2.17.15 Refrigeration science	J027A;
2.17.16 Heat load estimating of commercial refrigeration	J029A;
2.17.17.1 HVAC load estimating fundamentals	J029A;
2.17.17.2 HVAC load estimating	J043A;
2.17.18.1 Thermodynamics fundamentals	J065A; K040A;
2.17.18.2 Thermodynamics	J038A; J049A; K029A;
2.17.18.3 Heater exchanger design	J049A;
2.17.19 Fluid mechanics fundamentals	J065A;
2.17.20 Materials strength fundamentals	J031A;

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.17.21.1 Noise and vibration control fundamentals	J031A;
2.17.21.2 Advanced noise and vibration control	J038A;
2.17.22 Refrigeration and food storage technology	J032A; J033A;
2.17.23.1 Industrial refrigeration systems design fundamentals	J033A;
2.17.23.2 Industrial refrigeration system design	None
2.17.24 Commercial air conditioning systems design	J034A;
2.17.25 Statics	J038A;
2.17.26 Commercial refrigeration system design	J041A;
2.17.27 Air conditioning system design	J043A;
2.17.28 Psychrometrics - advanced	J043A;
2.17.29 Exhaust systems design	J044A;
2.17.30 Heating systems design	J045A;
2.17.31 Hydronic system design	J045A;
2.17.32 Sources of technical development and processes for their adoption	J050A;
2.17.33 Refrigeration systems	J063A;
2.17.34 Air conditioning systems	J063A;
2.17.35 Applied psychrometrics	J063A;
2.17.36 Ventilation systems	J064A;
2.17.37 Beverage vending cabinets	J071A;

## 2.18 – Safety

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.18.1 Occupational Health and Safety principles	A001A; A002A; A003A; A004A; A005A; A006A; A010A; A012A; A013A;
2.18.1 Occupational Health and Safety principles	B001A
2.18.1 Occupational Health and Safety principles	C001A; C002A; C003A; C004A; C005A; C006A; C007A; C008A; C009A; C010A; C012A;
2.18.1 Occupational Health and Safety principles	D001A; D002A; D003A; D004A; D005A; D007A; D008A; D009A; D010A; D011A; D012A; D013A; D014A; D015A; D016A; D017A; D018A; D019A; D020A; D021A; D022A; D023A; D024A; D025A; D026A; D027A; D028A; D029A; D030A; D031A; D032A; D033A; D034A; D043A; D046A; D050A; D051A; D052A; D053A; D054A; D055A;
2.18.1 Occupational Health and Safety principles	E001A; E002A; E003A; E004A; E005A; E006A; E007A; E008A; E009A; E010A; E019A; E020A; E021A; E022A; E023A; E025A; E026A; E027A; E028A; E029A; E030A; E032A; E033A; E034A; E035A; E036A; E037A; E040A; E041A; E042A; E043A; E044A; E045A; E046A; E047A; E048A; E050A; E051A; E060A; E061A; E062A; E063A; E064A;
2.18.1 Occupational Health and Safety principles	F001A; F002A; F003A; F004A; F005A; F006A; F007A; F008A; F009A; F010A; F011A; F012A; F013A; F014A; F015A;
2.18.1 Occupational Health and Safety principles	G001A; G002A; G003A; G004A; G005A; G007A; G008A; G009A; G010A; G011A; G012A; G013A; G015A; G016A; G017A; G018A; G019A; G020A; G021A; G022A; G023A; G024A; G025A; G026A; G027A; G028A; G029A; G030A; G031A; G032A; G034A; G035A; G036A; G037A; G038A; G039A; G040A; G041A; G042A; G043A; G044A; G045A; G046A; G047A;

	G048A; G049A; G050A; G051A; G052A; G053A; G054A; G055A; G056A; G057A; G058A; G059A; G060A; G061A; G062A; G064A; G065A; G066A; G067A; G068A; G071A; G072A;
2.18.1 Occupational Health and Safety principles	H001A; H002A; H003A; H004A; H005A; H006A; H007A; H008A; H009A; H010A; H011A; H012A; H013A; H014A; H015A; H016A; H017A; H018A; H019A; H020A; H021A; H022A; H023A; H024A; H025A; H026A; H027A; H028A; H029A; H030A; H031A; H032A H033A; H034A; H035A; H036A; H037A; H038A; H039A; H040A; H042A; H043A; H044A; H045A; H046A; H047A; H048A; H049A; H050A; H051A; H052A; H053A; H054A; H055A; H056A; H057A; H058A; H059A; H061A; H062A; H063A; H064A; H065A; H066A; H070A; H071A; H072A; H073A; H074A; H075A; H076A; H077A; H078A; H079A; H080A; H081A; H082A; H083A; H084A; H085A;
2.18.1 Occupational Health and Safety principles	I001A; I002A; I003A; I004A; I005A; I006A; I007; I008A; I009A; I010A; I011A; I012A; I013A; I014A; I015A; I017A; I019A; I020A; I021A; I022A; I023A; I025A; I026A; I027A; I028A; I029A; I030A; I034A; I035A; I036A;
2.18.1 Occupational Health and Safety principles	J002A; J003A; J004A; J005A; J006A; J007A; J008A; J009A; J010A; J011A; J012A; J013A; J014A; J015A; J016A; J017A; J018A; J019A; J020A; J021A; J022A; J023A; J024A; J025A; J026A; J027A; J028A; J029A; J030A; J031A; J032A; J033A; J034A; J035A; J036A; J037A; J038A; J039A; J041A; J042A; J043A; J044A; J045A; J046A; J047A; J048A; J049A; J050A; J051A; J052A; J053A; J054A; J055A; J056A; J057A; J058A; J059A; J060A; J061A; J062A; J063A; J064A; J065A; J066A; J067A; J068A; J070A; J071A; J072A; J073A;
2.18.1 Occupational Health and Safety principles	K001A; K002A; K003A; K004A; K005A; K006A; K007A; K008A; K009A; K010A; K011A; K012A; K013A; K014A; K017A; K018A; K019A; K020A; K023A; K024A;

	K025A; K026A; K027A; K028A; K029A; K030A; K031A; K032A; K033A; K035A; K037A; K038A; K039A; K040A; K041A;
2.18.1 Occupational Health and Safety principles	N001A; N002A; N003A; N004A; N005A; N006A; N007A; N008A; N009A; N010A; N011A; N012A; N013A; N014A; N015A; N016A; N017A; N018A; N019A; N020A; N025A; N026A; N027A; N028A;
2.18.1 Occupational Health and Safety principles	P001A; P002A; P003A; P004A; P005A; P006A; P007A; P008A;
2.18.1 Occupational Health and Safety principles	R001A; R002A; R003A; R004A; R005A; R006A;
2.18.2 Electrical safe working practices	A010A; A012A; A013A;
2.18.2 Electrical safe working practices	E021A;
2.18.2 Electrical safe working practices	F001A; F002A; F003A; F004A; F005A; F009A; F010A; F011A; F012A; F013A; F015A;
2.18.2 Electrical safe working practices	G001A; G002A; G003A; G004A; G005A; G008A; G009A; G010A; G011A; G012A; G013A; G015A; G017A; G018A; G019A; G020A; G021A; G022A; G023A; G024A; G025A; G026A; G027A; G028A; G029A; G030A; G031A; G032A; G034A; G035A; G036A; G037A; G038A; G040A; G041A; G042A; G043A; G044A; G045A; G046A; G049A; G052A; G053A; G054A; G055A; G056A; G057A; G058A; G059A; G060A; G062A; G071A; G072A;
2.18.2 Electrical safe working practices	H044; H053A;
2.18.2 Electrical safe working practices	I015A;
2.18.2 Electrical safe working practices	J007A; J009A; J070A;
2.18.2 Electrical safe working practices	K023A; K025A; K026A; K027A; K028A; K030A; K033A; K035A; K037A;
2.18.2 Electrical safe working practices	N001A; N002A; N003A; N004A; N005A; N006A; N007A; N008A; N009A; N010A; N011A; N012A; N013A; N014A; N015A; N016A; N017A; N018A; N019A; N020A; N025A; N026A; N027A; N028A;
2.18.2 Electrical safe working practices	P001A; P002A; P003A; P005A; P006A; P007A; P008A;

2.18.3.1 Refrigeration and air conditioning safe working practices	J003A; J006A; J007A; J008A; J009A; J011A; J012A; J013A; J014A; J015A; J016A; J017A; J018A; J019A; J020A; J052A; J053A; J054A; J055A; J061A; J062A; J066A; J067A; J070A; J071A; J072A;
2.18.3.2 Split air conditioning systems safe working practices	J005A; J060A;
2.18.4 Remote area power supply safe working practices	K001A; K002A; K003A; K004A; K005A; K006A; K007A; K017A; K018A; K019A; K020A;
2.18.5 Rail safe working practices	N001A; N002A; N003A; N004A; N005A; N006A; N007A; N008A; N009A; N010A; N011A; N012A; N013A; N014A; N015A; N016A; N017A; N018A; N019A; N020A; N025A; N026A; N027A; N028A;
2.18.6 Hazardous area safe working practices	G018A; M001A; M002A; M003A; M004A; M005A; M006A; M009A; M010A; M011A; P004A;
2.18.7 Instrumentation safe working practices	I001A; I002A; I003A; I004A; I005A; I006A; I007; I008A; I009A; I010A; I011A; I012A; I013A; I014A; I015A; I017A; I019A; I021A; I022A;
2.18.8.1 Occupational Health and Safety, supervisory responsibilities	E017A;
2.18.8.2 Occupational Health and Safety, enterprise responsibilities	C004A; C005A; C006A; C007A; D047A; D048A; E010A; E011A; E012A; E013A; E014A; E015A; E016A; E018A; E024A; E070A; E071A; E072A; E073A; E074A; E075A; E077A; G014A; G038A; G039A; G069A; G070A; H029A; H030A; H031A; H032A H033A; H040; H041; H044A; H056A; H060A; H076A; H077A; H078A; H079A; 1034A; 1035A; 1036A; 1037A; J040A; J069A; K021A;
2.18.9 Electronic safe working practices	D002A; D012A; D030A; D052A; D053A; D054A; D055A
2.18.9 Electronic safe working practices	H001A; H002A; H003A; H004A; H005A; H006A; H007A; H008A; H009A; H010A; H011A; H012A; H013A; H014A; H015A; H016A; H017A; H018A; H020A; H021A; H022A; H023A; H024A; H027A; H028A; H029A; H030A; H031A; H032A; H033A; H034A; H037A; H038A; H039A; H040A; H042A;

	H043A; H044A; H046A; H047A; H048A; H049A; H050A; H051A; H052A; H054A; H055A; H056A; H066A; H070A; H071A; H072A; H073A; H074A; H075A; H076A; H077A; H078A; H079A;
2.18.9 Electronic safe working practices	K024A;
2.18.10 Medical equipment safe working practices	H034A; I015A;
2.18.11 Fire protection equipment safe working practices	H061A; H062A; H063A; H064A; H065A;
2.18.12 Business equipment servicing safe working practices	None
2.18.13 Appliance servicing safe working practices	J051A; J052A; J054A; J055A; J056A; J057A; J058A; J059A; J060A; J061A; J073A; P007A;
2.18.14 Aerial safety practice	F012A;
2.18.15 Trenching safety practices	F013A;
2.18.16 Documenting hazards and identifying risks	E032A; E033A; E034A; E035A; E036A; E037A;

**2.19 – Special requirements, hazardous areas and restricted**

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.19.1 Hazardous areas and explosion-protection principles	M001A; M002A; M003A; M004A; M005A; M006A; M007A; M008A; M009A; M010A; M011A; M012A; M013A; M014A; M015A; M016A; M017A; M018A; P004A;
2.19.2 Explosion-protected equipment	M001A; M002A; M004A; M005A; M006A; M007A; M008A; M009A; M010A; M011A; M012A; M014A; M016A; M017A; M018A; P004A;
2.19.3 Flameproof (Ex‘d’) explosion-protection technique	M002A; M004A; M005A; M006A; M007A; M008A; M009A; M010A; M011A; M012A; M014A; M016A; M017A; M018A;
2.19.4 Increased safety (Ex‘e’) explosion-protection technique	M002A; M004A; M005A; M006A; M007A; M008A; M009A; M010A; M011A; M012A; M014A; M016A; M017A; M018A;
2.19.5 Non-sparking (Ex‘n’) explosion-protection technique	M002A; M004A; M005A; M006A; M007A; M008A; M009A; M010A; M011A; M012A; M014A; M016A; M017A; M018A;
2.19.6 Intrinsic safety (Ex‘i’) explosion-protection technique	M002A; M004A; M005A; M006A; M007A; M008A; M009A; M010A; M011A; M012A; M014A; M016A; M017A; M018A;
2.19.7 Pressurization (Ex‘p’) explosion-protection technique	M002A; M004A; M005A; M006A; M007A; M008A; M009A; M010A; M011A; M012A; M014A; M016A; M017A; M018A;
2.19.8 Explosion-protection techniques for dusts	M002A; M004A; M005A; M006A; M007A; M008A; M009A; M010A; M011A; M012A; M014A; M016A; M017A; M018A;
2.19.9 Common characteristics of explosion-protection techniques	M002A; M004A; M005A; M006A; M007A; M008A; M009A; M010A; M011A; M012A; M014A; M016A; M017A; M018A;
2.19.10 Hazardous areas installation and maintenance requirements	M004A; M005A; M006A; M009A; M010A; M011A; M012A; M016A; M017A; M018A;
2.19.11 Hazardous areas cable termination techniques	M004A; M005A; M006A; M009A; P004A;

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.19.12 Hazardous areas detailed inspection techniques	M011A;
2.19.13.1 Explosion-protected equipment overhaul and repair, general requirements	M007A; M014A;
2.19.13.2 Overhaul and repair requirements specific to each explosion-protection technique	M007A; M014A;
2.19.14.1 Explosion-protected equipment modification, general requirements	M014A;
2.19.14.2 Modification requirements specific to each explosion-protection technique	M014A;
2.19.15 Hazardous areas installation planning	M016A; M017A; M018A;
2.19.16 Common classified hazardous areas	M016A; M017A; M018A;
2.19.17 Hazardous areas classification techniques	M015A;
2.19.18 Hazardous areas close inspection requirements	M010A; M011A;
2.19.19 Hazardous areas management	M012A; M013A;
2.19.20 Explosion-protected electrical systems design	M017A; M018A;
2.19.21 Explosion-protected equipment conformity assessment	M008A;
2.19.22 Hazardous areas installation testing	M009A;
2.19.23 Explosion-protection visual checks	M001A;
2.19.24 Gas detection – portable devices	M003A;
2.19.25 Gas detection – fixed equipment	M005A; M017A;
2.19.26 Evaluation and selection of gas detection equipment (portable and fixed)	M018A;
2.19.29 Disconnect/Reconnect	P001A;
2.19.30 Flexible cords and plugs to 250 V	P002A;
2.19.31 Flexible Cords/Cables and Plugs to 1000 V	P003A;
2.19.32 Disconnect and reconnect HV electric propulsion components	P005A;
2.19.33 High Voltage Flexible Cables and Plugs Exceeding 1000 V	P006A;
2.19.34 Fault Find to 250 V – Motors	P007A; Multi phase motor endorsements, composite equipment, and/or control devices endorsement
2.19.35 Fault Find to 250 V – Water Heaters	P007A; Water heater endorsements
2.19.36 Fault Find to 250 V – General Appliances	P002A; P007A; General single phase motors, composite equipment, and/or control devices endorsement
2.19.37 Fault Find to 1000 V - Motors	P007A; Multi phase motor

Essential Knowledge and Associated Skills	Competency Standard Units
	endorsements, composite equipment, and/or control devices endorsement
2.19.38 Fault Find to 1000 V – Water Heaters	P007A; Water heater endorsements
2.19.39 Produce Status Reports Using Established Procedures	P001A; P002A; P003A; P004A; P005A; P006A; P007A; P008A;

## 2.20 – Sustainable energy and environment

Essential Knowledge and Associated Skills	Competency Standard Units
2.20.1 Sustainable energy principles	J006A;
2.20.2 Environmental and heritage awareness	J006A;
2.20.3 Introduction to renewable energy technologies	K008A; K009A; K010A; K011A; K012A; K013A; K014A; K023A;
2.20.4 Greenhouse reduction strategies	K013A; K014A;
2.20.5 Remote area essential services facilities	K008A; K009A; K010A;K011A; K017A;
2.20.6 Remote area essential services power plant	K011A; K020A;
2.20.7 Remote area essential services waste water facilities	K019A;
2.20.8 Remote area essential services water facilities	K018A;
2.20.9.1 Stand-alone renewable energy system components	K028A;
2.20.9.2 Stand-alone renewable energy system design consideration	K039A;
2.20.10 Hybrid Energy Systems	K033A;
2.20.11 Sustainability and greenhouse reduction strategies	K032A;
2.20.12 Energy efficient building design	K041A;
2.20.13 Photovoltaic installations	K024A;
2.20.14 Photovoltaic power systems	K025A;
2.20.15 Renewable energy system electronics	K027A;
2.20.16.1 Fundamentals of wind energy conversion	K030A;
2.20.16.2 Wind energy conversion systems	K031A;
2.20.17.1 Micro-hydro systems installation and maintenance processes	K037A; K038A;
2.20.17.2 Micro-hydro systems	K038A;
2.20.18 Solar water heating systems	K029A;
2.20.19 Grid connected inverters	K026A; K035A;
2.20.20 Renewable energy heating	K029A;
2.20.21 Distributed generation	K040A;

## 2.21 – System – control and automated

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
2.21.1 Machine design and positioning	E064A;
2.21.2 Mechanical drives and engineering	E062A;
2.21.3 Materials and strength of materials	E063A;
2.21.4 Statics and dynamics	E061A;
2.21.5 Advanced fluid mechanics	I028A;
2.21.6 Electronic interfacing to mechanical processes	I029A;
2.21.7 Electronic control of fluid processes	I027A;
2.21.8 Electronic interfacing to robotic processes	I030A;
2.21.9 Material science	E060A;
2.21.10 Thermodynamics	E060A;
2.21.11 Pneumatics	I026A;
2.21.12 Hydraulics	I026A;
2.21.13 Fluid power control	I025A;

**T 2.4 – HV Switching**

<b>Essential Knowledge and Associated Skills</b>	<b>Competency Standard Units</b>
T2.4.3 High voltage switching principles	G034A;
T2.4.4 High voltage fault switching principles	G034A;
T2.4.5 High voltage distribution transformer principles	G034A;
T2.4.6 High voltage SWER system	G034A;
T2.4.7 Feeder automation system	G034A;



# **ELECTROTECHNOLOGY TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.2  
Essential Knowledge and Associated Skills**

**Volume 2 of 2**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## Essential Knowledge and Associated Skills (EKAS)

Reference to the Essential Knowledge and Associated Skills is found in each Electrotechnology Industry Competency Standard Unit (Section 6). These references are detailed in the section of that follows. To insure that the content of theory and associated skills training aspect of the respective competency standard unit is met, users of the Training Package must include all the Essential Knowledge and Associated Skills clauses when developing learning specifications and support materials.

### EKAS Clause List

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## **Essential Knowledge and Associated Skills – Contextualisation**

In the competency standard units, ‘notes’ have been placed against respective aspects that include scope, performance criteria, range statement and essential knowledge and associated skills and other related sections. The insertion of these “notes” is primarily to provide users and support material developers with examples of the form and type related to technical content principles, technology, equipment, or processes that may be used to cover the outcomes. The examples should be treated as information that adds clarity for the purposes of assisting in guidance of the depth and breadth that is to be covered.

As the type, form, process, or technique of technology and equipment may change it is therefore expected and encumbered on RTOs to continue to be current in the content of their delivery arrangements.

It is therefore appropriate for RTOs to use the notes in relation to technology and equipment references as advisory information. In these instances RTOs should aim to accommodate the adoption of improved and new technologies in the scope/range and essential knowledge and associated skills of the competency standard units by varying the context examples given in the referenced ‘Notes:’ to the Performance Criteria, Range Statement and Essential Knowledge and Associated Skills. However, the contextualisation must not be such that the outcome of the competency standard units is altered in any way.

Where contextualisation of the notes varies the outcome of the competency standard units and its related content, RTOs should consult with EE-Oz Training Standards to explore options for incorporating and/or covering the new arrangements, so that currency of the Training package is maintained.

It should be noted that any need to alter the competency standard units from its intended outcome requires a new or varied competency standard unit. Such changes are to be undertaken through the continuous improvement processes required of Training Packages, which for this Training Package is managed by EE-Oz Training Standards.

## 2.1 Cables, conductors and terminations

### 2.1.1 Cable protection and support

Evidence shall show an understanding of cable protection and support method and accessories to an extent indicated by the following aspects:

a) Requirements to protect and support cables adequately

Note:

Examples of protection are protection against mechanical damage, protection from adverse temperatures and corrosion and protection from magnetic field that may affect the performance of the cable.

b) Cable support and protection devices, accessories and typical applications

Note:

Examples include metallic and non-metallic conduits, duct and trunking, cable ladder and tray, cable clips and ties and related accessories.

c) Installation techniques encompassing:

- Cable installation equipment
- Cable drawing and hauling techniques

### 2.1.2 Cable types and applications

Evidence shall show an understanding of the types of cables used in the electrotechnology industry and their application to an extent indicated by the following aspects:

a) Structural components of cables and their purpose

Note:

Components include conductors and conductor material; insulation; sheathings and servings.

b) Application of various cables types

c) Cable varieties

Note:

Cable varieties include single cables, flexible cables, flexible cords, shielded cables, armoured cables, ribbon cables, other similar and like cables

d) Typical characteristics and use of power circuit cables and control circuit cables

### 2.1.3 Cables in buildings, structures and premises

Evidence shall show an understanding of installing cables in buildings, structures and premises to an extent indicated by the following aspects:

a) Building construction method and construction sequence.

b) Typical cable routes through buildings, structures and premises.

c) Building codes affecting the installation of cables in buildings, structures and premises

Note:

Building codes include limitation on penetration structural elements and maintenance of fire protection interiority

d) Cable segregation requirements

### 2.1.4 Basic cable and conductor terminations

Evidence shall show an understanding of basic cable and conductor terminations to an extent indicated by the following aspects:

a) Insulation removal and replacement

- b) Conductor handling and cable terminations encompassing:
- General aspects and soldering involving pins on electronic components and stranded conductors carrying current up to 25 amperes.
  - Application of connecting devices for conductors and terminals
  - Continuity through connections and insulation resistance testing
  - Stress release on cables/conductors.

#### **2.1.5.1 Power cable and conductor terminations**

Evidence shall show an understanding of power cable and conductor terminations to an extent indicated by the following aspects:

- a) Types of cable glands and their application

Note:

Types include glands for circular sheathed cables; steel wire armoured (SWA) cables and mineral-insulated metal-sheathed (MIMS) cables.

- Cable termination techniques

- b) Terminal types and applications

- c) Conductor termination techniques encompassing:

- Need for sound termination
- Consequences of poor conductor termination
- Conductor and terminal preparation

Note:

Conductors include copper and aluminium

#### **2.1.5.2 Bus bar techniques**

Evidence shall show an understanding of bus bar techniques to an extent indicated by the following aspects:

- a) Materials and applications  
 b) Shaping techniques  
 c) Terminations and connections

#### **2.1.6.1 Telecommunication cable and conductor terminations**

Evidence shall show an understanding of telecommunication cable and conductor terminations to an extent indicated by the following aspects:

- a) Approved termination devices and sockets.  
 b) Special termination tools and their use.  
 c) Cable colour coding up to 100 pair indoor and outdoor cable  
 d) End to end testing  
 e) Methods of terminating cables encompassing:
- Cables less than twenty pair
  - Twenty pair cable and greater
- f) Cable labelling devices  
 g) Colour coding of cables, sockets and termination modules and standard connectors used with twisted pair, optical fibre and coaxial cables

### **2.1.6.2 Telecommunication aerial cabling**

Evidence shall show an understanding of telecommunication aerial cabling to an extent indicated by the following aspects:

- a) Hazard and control measures in aerial cabling working environment
- b) Soundness of pole for aerial cabling
- c) Aerial safety equipment
- d) Procedure to applying pole top rescue
- e) Aerial construction methods and regulations
- f) Joining of an aerial cables

### **2.1.6.3 Telecommunication below ground cabling**

Evidence shall show an understanding of telecommunication below ground to an extent indicated by the following aspects:

- a) Hazard and control measures in underground cabling working environment
- b) Types and purposes of mechanical and manual aids.
- c) Purpose, location, and capacity of man holes and pits.
- d) Types of underground cable
- e) Procedure for the excavation of a site for the installation of a man hole, pit, pipe and conduit

### **2.1.6.4 Voice and data cabinet cabling terminations**

Evidence shall show an understanding of voice and data cabinet cabling terminations, to an extent indicated by the following aspects.

- a) Communication cable and conductor terminations encompassing:
  - approved termination devices and sockets
  - special termination tools and their use
  - cable colour coding up to 100 pair indoor and outdoor cable
- b) Methods of terminating cables encompassing:
  - cables less than twenty pair
  - twenty pair cable and greater
  - structured cables
  - coaxial cables
  - optical fibre cables
  - termination safety practices
- c) Cable labelling devices

### **2.1.7.1 Performance (copper) data cable installation and terminations**

Evidence shall show an understanding of performance data cabling and conductor installation and terminations to an extent indicated by the following aspects:

- a) High performance cable types encompassing:
  - High performance transmission parameters

- Electrical characteristics
  - Structure of UTP, FTP, and STP higher performance cables
- b) High performance cabling installation and termination encompassing:
- Separation and segregation requirements and techniques
  - Requirements for connecting hardware as defined in current Standards
  - Installation requirements and techniques applicable to high performance cable

### **2.1.7.2 Coaxial cable installation and terminations**

Evidence shall show an understanding of coaxial cabling installation and terminations to an extent indicated by the following aspects:

- a) Coaxial cable types encompassing:
- Structure of qualshield and trishield coaxial cables armour plated coaxial cable
  - Typical applications
- b) Coaxial cabling installation and termination encompassing:
- Separation and segregation requirements and techniques.
  - Coaxial cable connectors compatible with the cable type and the environment
  - Installation requirements and techniques applicable to coaxial cables
  - Coaxial cable connectors and termination techniques

### **2.1.7.3 Optical fibre cabling installation and terminations**

Evidence shall show an understanding of optical fibre cabling installation and terminations to an extent indicated by the following aspects:

- a) Operating principles of optical fibre transmission encompassing:
- Types of optical fibre types available for telecommunications voice and data transmission.
  - Difference between multimode and single mode transmission.
  - Advantages of optical fibre cable compared to other cables.
  - Applications of optical fibre cables.
  - Requirements of optical fibre cables as specified in current Standards
  - Hazards associated with working with optical fibre.
- b) Installation techniques encompassing:
- Purpose and procedures for pre-testing optical fibre cable prior to installation.
  - Regulations, standards and codes applicable to optical fibre installation
  - Bending radii and hauling requirements.
  - Cable support and securing mechanisms
  - Safety precautions
- c) Termination and splicing techniques
- Risk control measures applied in the preparation of fibre for termination.
  - Termination devices and method
  - Preparation and splicing techniques.
  - Devices used to protect terminations and splices against mechanical damage and prevent contamination.

#### **2.1.7.4 Specialist audio/video cabling installation and termination**

Evidence shall show an understanding of specialist audio/video cabling installation and terminations to an extent indicated by the following aspects:

- a) Features of high performance audio and video cables and interconnects
- b) High performance audio and video cables and interconnects encompassing:
  - Installation methods and limitations
  - Terminations techniques as specified by cable manufacturers

#### **2.1.8 Electronic cable and conductor terminations**

Evidence shall show an understanding of terminating cable and conductor used in electronic equipment to an extent indicated by the following aspects:

- a) Cable and conductor types and characteristics encompassing:
  - Insulated wire
  - Harness wiring,
  - High performance cables

Note.

  - 1. Examples of characteristics are transmission performance parameters and electrical characteristics
  - 2. Types include UTP, FTP, and STP
- b) Coaxial cables types and characteristics

Note.

Types include qualshield, trishield coaxial and armour plated coaxial cables
- c) Cable anchoring and support methods
- d) Termination methods

#### **2.1.9 Winding wire types and connections**

Evidence shall show knowledge and skills of winding wires and connections to an extent indicated by the following aspects:

- a) Winding wires and their applications.
- b) Winding wire connection methods encompassing:
  - Conductor preparation
  - Connection mediums
  - Insulation methods

#### **2.1.10 High voltage motor winding, conductors, connections methods and insulation**

Evidence shall show knowledge and skills of high voltage winding conductors, connections and insulation to an extent indicated by the following aspects:

- a) HV winding conductors and their applications.
- b) HV winding wire connection methods encompassing:
  - Conductor handling
  - Conductor preparation
  - Connection mediums

c) Insulation types and methods

### **2.1.11 Integrated cabling arrangements**

Evidence shall show knowledge and skills of integrated cabling arrangements to an extent indicated by the following aspects:

- a) Types of service that use integrated cabling arrangements, e.g. “Smart wiring” concept.
- b) ELV communication and control cabling selection methods encompassing:
  - Limitations imposed by equipment
  - Limitations imposed by route length
  - Communication rates
- c) Cable schedules and planning
- d) Cable identification methods

## 2.2 Common, commercial, processes and enterprise specific knowledge and skills

### 2.2.1 Enterprise communication methods

Evidence shall show an understanding of enterprise communication methods to an extent indicated by the following aspects:

- a) Communicating with personnel encompassing:
  - Oral communications
  - Written procedures and work instructions
- b) Communicating with suppliers
- c) Communicating with customers

### 2.2.2 Enterprise work activities records

Evidence shall show an understanding of work activities records to an extent indicated by the following aspects:

- a) Purpose and extent of maintaining work activities records in an enterprise
- b) Types of records for maintaining work activities in an enterprise
- c) Methods for recording and maintaining work records
- d) Work records required by regulation requirements

### 2.2.3 Fault finding techniques

Evidence shall show an understanding of technical fault finding to an extent indicated by the following aspects:

- a) Factors to consider in clarifying the nature of a fault encompassing:
  - Initial fault report
  - Confirmation of symptoms of the fault
  - Comparison of symptoms with normal operation
- b) Effect to cause reasoning — assumptions of possible causes
- c) Methods for testing assumptions encompassing:
  - Visual inspection
  - Sectional testing
  - Split-half tests
  - Component isolation
- d) Dealing with intermittent faults

Note:

Typical causes of intermittent faults are vibration, shock, changes in temperature and electromagnetic interference.

### 2.2.4 Problem solving techniques

Evidence shall show an understanding of problem solving concepts and techniques as they apply in the workplace, to an extent indicated by the following aspects:

- a) Identify problems

Note: Examples may include: Process and quality problems; Equipment selection, availability and failure; Teamwork and work allocation problems; Safety and emergency situations and incident; Performance gaps; Profit improvement and the like.

b) Mathematical Tools

Note.

Examples may include: Average, Standard deviation and the like.

c) Use of analytical techniques in problem solving

Note.

Examples may include: Brainstorming; Fishbone diagrams/cause and effect diagrams; Logic trees; Process logic/process requirements; Similarity/difference analysis; Pareto analysis; Force field/SWOT analysis.

d) Using tools to assistance in problem solving

Note.

Examples may include: Procedures and work instructions; Safety data sheets; Job cards; Maintenance logs; Plant drawing.

e) Determine corrective action encompassing:

- Tools
- Mode of communication procedure used within each enterprise
- Established work procedures and policies
- Size and structure of the teams/enterprise
- Group goals - team, section, enterprise
- Enterprise specific conflict resolution procedures
- Action plans
- Priority requirements
- Measurable objectives
- Resource requirements
- Methods for reaching objectives
- Timelines
- Safety requirements
- Risk assessment
- Environmental requirements

f) Communicate recommendations

Note.

Examples may include: Feedback requirements; Corrective action and analysis; Following up recommendations and the like.

g) Implement Monitoring encompassing:

- Identifying components to be measured
- Measurement and monitoring techniques
- Measurement and monitoring tools

### 2.2.5 Enterprise customer relations protocols

Evidence shall show an understanding of enterprise customer relations protocols to an extent indicated by the following aspects:

a) Purpose of customer relations

- b) Procedures for dealing with customers
- c) Dealing with customer issues

### **2.2.6 Enterprise quality management system, basics**

Evidence shall show an understanding of enterprise quality management system to an extent indicated by the following aspects:

- a) Purpose of a quality system
- b) Procedures pertaining to the relevant work function
- c) Work instructions pertaining to the relevant work function

### **2.2.7 Enterprise purchasing system**

Evidence shall show an understanding of the purchasing system within an enterprise to an extent indicated by the following aspects:

- a) Purchasing process
- b) Common suppliers
- c) Authorities to purchase

### **2.2.8 Enterprise costing methods**

Evidence shall show an understanding of costing methods in an enterprise to an extent indicated by the following aspects:

- a) Costing policy
- b) Purchase prices and discounts for materials
- c) Labour charge out rates
- d) Margins

### **2.2.9 Enterprise stock control methods**

Evidence shall show an understanding of stock control methods to an extent indicated by the following aspects:

- a) Enterprise purchasing policy
- b) Stock data base
- c) Purchase and sales entry mechanisms
- d) Reordering methods

### **2.2.10 Job costing techniques**

Evidence shall show an understanding of costing small jobs to an extent indicated by the following aspects:

- a) Resources to be quantified and costed
- b) Costing labour plant and materials
- c) Service costs and margins.

### **2.2.11.1 Estimating techniques**

Evidence shall show an understanding of estimating to an extent indicated by the following aspects:

- a) Documents used in estimating
- b) Resources to be quantified and costed
- c) Material take-off methods
- d) Costing encompassing:
  - resource (labour, plant, equipment and materials)
  - contingency
  - money
  - margins
- e) Labour rates method of costing
- f) Life cycle costing analysis
- g) Documenting estimations and costing.
- h) Evaluating estimates and costs

### **2.2.11.2 Specification development**

Evidence shall show an understanding of specification writing to an extent indicated by the following aspects:

- a) Purpose and nature of specification
- b) Performance based specifications
- c) Prescriptive specifications
- d) Acceptable evidence of compliance
- e) Additional service required with the supply of equipment
- f) Dealing with suppliers and manufacturer's
- g) Documenting specification.

### **2.2.12 Tendering requirements**

Evidence shall show an understanding of tenders to an extent indicated by the following aspects:

- a) Purpose and sources of a tender
- b) Documents supplied with a tender
- c) Typical special conditions included in a tender
- d) Tender submission requirements

### **2.2.13 User instruction techniques**

Evidence shall show an understanding of instructing users in the use of specific items of equipment and systems to an extent indicated by the following aspects:

- a) Methods for evaluating user needs

Note:

User needs should include how equipment is used efficiently and safely and identifying wear and tear and damage to the equipment that requires repairing.

- b) Basic instruction methods

Note:

Methods of instruction should be appropriate to the culture of the users and the equipment for which instruction is given.

c) Methods for evaluating user's ability use equipment correctly

#### **2.2.14 Contracts, format, responsibilities and obligations**

Evidence shall show an understanding of the format, responsibilities and obligations of a contract to an extent indicated by the following aspects:

- a) Contract purpose and formats
- b) Documents legally attached to a contract
- c) Responsibilities and obligations of parties entering a contract
- d) Regulatory requirements

#### **2.2.15 Risk management, application and techniques**

Evidence shall show an understanding of risk management to an extent indicated by the following aspects:

- a) The need for risk management within the broad project management framework
- b) Risk management methodologies, their capabilities, limitations, applicability and outcomes
- c) Uncertainty and the means of measurement
- d) The application of risk management tools and techniques
- e) Risk management in the context of the project life cycle and other project management functions
- f) Implementing risk management

##### **2.2.16.1 Project Planning**

Evidence shall show an understanding of project planning to an extent indicated by the following aspects:

- a) Purpose of project planning
- b) Documents needed to plan a project
- c) Factors influencing sequence and restraints of project activities
- d) Critical path analysis encompassing:
  - Graphical representation methods
  - Methods of representing time/rates

##### **2.2.16.2 Project development**

Evidence shall show an understanding of project development to an extent indicated by the following aspects:

- a) Purpose and source of a design brief
- b) Engineering solution development encompassing:
  - Role of standards
  - Use of proven designs
- c) Design and detail drawings required.

- d) Role of and form of job specification.
- e) Project documentation and legal issues

### **2.2.17 Project management**

Evidence shall show an understanding of project management concepts to an extent indicated by the following aspects:

- a) Defining project parameters

Note:

Examples may include: Project scope; Project stakeholders and clients; Project phases and the relationship between phases; Time requirements and limitations; Resource requirements and limitations; Quality requirements and limitations.

- b) Time management

Note:

Examples may include: time management concepts; standard practices for ensuring a project runs to time and the like.

- c) Financial management

Note.

Examples may include: Financial management concepts; Standard practices for managing project finances; Project budgets; Costs, variations and estimations; Invoicing against project phases/deliverables; Acquittals and the like.

- d) Quality management

Note.

Examples may include: Quality management concepts; Standard practices for managing quality within a project.

- e) Human Resource management

Note.

Examples may include: human resource management concepts; standard practices for managing personnel within a project

- f) Communication management

Note.

Examples may include: Communication management concepts; Standard practices for managing communication within a project and the like.

- g) Risk management and contingencies

Note.

Examples may include: risk management concepts; standard practices for managing risk within a project; Internal risks; External risks; Risk minimisation; Risk removal; Contingencies and the like.

- h) Procurement management

Note.

Examples may include: procurement management concepts; standard practices for managing procurement and the like.

- i) Physical Resource management

Note.

Examples may include: Types of physical resource, including; Equipment, Technology, Information, Facilities; Physical resource management concepts; Standard practices for managing physical resources

- j) Contracts

Note.

Examples may include: Understanding project contracts; Standard practices for working to contract

specifications; Contract format; Contract content; Legal obligations of contract parties; Accompanying documentation including; Contract Schedules and the like.

k) Performance assessment and continuous improvement

Note.

Examples may include: standard performance assessment practices; standard continuous improvement practices and the like

### **2.2.18 Critical path and project analysis**

Evidence shall show an understanding of customer/client relations to an extent indicated by the following aspects:

- a) Purpose of critical path analysis
- b) Essential data
- c) Relational sequence of work activities
- d) Graphical representation methods
- e) Methods of representing time/rates
- f) Monitoring methods

### **2.2.19 Customer/Client relations**

Evidence shall show an understanding of customer/client relations to an extent indicated by the following aspects:

- a) Importance of customer/client relations
- b) Interpersonal skills that enhance customer/client
- c) Dispute resolution
- d) Customer/client relations strategies

### **2.2.20 Computer use basics**

Evidence shall show an understanding of computer use basics to an extent indicated by the following aspects:

- a) Starting up
- b) Selecting application
- c) Entering information
- d) Saving
- e) Printing

### **2.2.21 Engineering analysis, decision making and reporting**

Evidence shall show an understanding of analysis, decision making and reporting as they apply to engineering work functions to an extent indicated by the following aspects:

- a) Techniques of analysis encompassing:
  - use of appropriate sampling techniques to collect data.
  - types of data and classification.
  - effective questionnaire design
  - data collection errors.
  - frequency tables.
  - statistical diagrams – drawing and interpretation.

- the general shape of a frequency distribution.
  - different types of diagrams.
  - mean time between failures calculations
- b) Summary of statistics encompassing:
- measures of central tendency
  - measures of dispersion
  - a 5-point summary for a given data set, box and whisker plot distribution
  - data sets comparison using measures of centre and spread
  - the effect of outliers on measures of centre and spread
  - use computer programs or calculators to simplify calculations
- c) Correlation and regression encompassing:
- bivariate data and scatter diagrams.
  - product-moment correlation coefficient calculation and interpretation.
  - difference between causation and correlation.
  - equations of regression lines from bivariate data with a calculator and line plotting on a scatter diagram.
  - using the equation of regression to make predictions in practical situations.
  - investigation of practical problems using correlation and regression.
- d) Investigation and reporting encompassing:
- presentation of a well formatted report with a clearly stated aim.
  - using the internet to obtain relevant data.
  - description of the statistical method and design chosen to meet the aim of the investigation.
  - statistical analysis and results reporting.
  - evaluation and interpretation of the results of the investigation.
  - discussion of the investigation with reference to real world applications.
  - chronology of the investigation.

#### **2.2.22 Enterprise work/business coverage**

Evidence shall show an understanding of the work covered by the employing enterprise to an extent indicated by the following aspects:

- a) Systems and equipment of the electrotechnology disciplines covered by the enterprise
- b) Where and how the electrotechnology disciplines are used
- c) The work activities involved
- d) Role of various sectors of personnel in the enterprise

#### **2.2.23 Enterprise regulatory requirements and non regulatory standards**

Evidence shall show an understanding of regulatory requirements to an extent indicated by the following aspects:

- a) Compliance regulations for businesses
- b) Methods of meeting compliance
- c) Non-regulatory standards and their effects on business

#### **2.2.24 Technical examination and testing methods**

Evidence shall show an understanding of technical examination and testing methods to an extent indicated by the following aspects:

- a) Compliance certification encompassing:
  - the purposes of certification of equipment;
  - the parties involved in the assessment/testing and certification of equipment, and
  - the scheme for recognition of assessment/testing and certification
- b) Preparation required to assess equipment for compliance with Standards encompassing:
  - documentation required prior to conducting conformity assessment;
  - tests necessary to establish that an item of equipment conforms with relevant Standards;
- c) Assessing and testing equipment encompassing:
  - types of assessment tests
  - test set ups and procedures.
  - recording and reporting requirements of conformity assessment.

### **2.2.25 Research Concepts**

Evidence shall show an understanding of research concepts and techniques, as they apply in the workplace, to an extent indicated by the following aspects:

#### a) Terminology

Note.

Examples may include: Terminology used in a research workplace; Terminology used in research-specific literature and the like.

#### b) Theory – why conduct research?

Note. Examples may include: The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.

#### c) The research environment

Note.

Examples may include: The research work environment; Standard research practices; Industrial, legal, ethical, political and market environment considerations; Legislation and regulation; Contractual obligations of all parties and the like.

#### d) Planning to conduct research

Note.

Examples may include: Concept development and/or research brief analysis; Research objectives; Research deliverables; Research project plan; Literature reviews; Methodology development, including; Experimental design, Technology selection, Information Management system selection and the like

#### e) Clients

Note.

Examples may include: Identifying client viewpoints and stake in project; Identifying client requirements and parameters; Determining research budgets, timelines, milestones and quality attributes with clients.

#### f) Research, Development and Commercialisation

Note.

Examples may include: Research and Development goals versus Commercialisation goals and realities; Research and Development to inspire a commercialisation process.

### **2.2.26 Automated systems industry sector customs and practices**

Evidence shall show an understanding of automated systems industry sector customs and

practices to an extent indicated by the following aspects:

- a) Technical aspects of project planning and management encompassing:
  - Method of ensuring equipment meets specified performance requirements
  - Performance/cost benefit analysis
  - Equipment procurement
- b) Typical approaches to planning and management
- c) Successful planning techniques
- d) Best practice management methods and styles

### **2.2.27 Computer industry sector customs and practices**

Evidence shall show an understanding of computer industry sector customs and practices to an extent indicated by the following aspects:

- a) Technical aspects of project planning and management encompassing:
  - Method of ensuring equipment meets specified performance requirements
  - Equipment performance/cost benefit analysis
  - Equipment procurement
- b) Typical approaches to planning and management
- c) Successful planning techniques
- d) Best practice management methods and styles

### **2.2.28 Electrical industry sector customs and practices**

Evidence shall show an understanding of electrical industry sector customs and practices to an extent indicated by the following aspects:

- a) Technical aspects of project planning and management encompassing:
  - Method of ensuring equipment meets specified performance requirements
  - Performance/cost benefit analysis
  - Equipment procurement
- b) Typical approaches to planning and management
- c) Successful planning techniques
- d) Best practice management methods and styles

### **2.2.29 Electronic systems industry sector customs and practices**

Evidence shall show an understanding of electronic industry sector customs and practices to an extent indicated by the following aspects:

- a) Technical aspects of project planning and management encompassing:
  - Method of ensuring equipment meets specified performance requirements
  - Performance/cost benefit analysis
  - Equipment procurement
- b) Typical approaches to planning and management
- c) Successful planning techniques

d) Best practice management methods and styles

### **2.2.30 Control systems industry sector customs and practices**

Evidence shall show an understanding of control system industry sector customs and practices to an extent indicated by the following aspects:

- a) Technical aspects of project planning and management encompassing:
  - Method of ensuring equipment meets specified performance requirements
  - Performance/cost benefit analysis
  - Equipment procurement
- b) Typical approaches to planning and management
- c) Successful planning techniques
- d) Best practice management methods and styles

### **2.2.31 Refrigeration and air conditioning industry sector customs and practices**

Evidence shall show an understanding of refrigeration and air conditioning industry sector customs and practices to an extent indicated by the following aspects:

- a) Technical aspects of project planning and management encompassing:
  - Method of ensuring equipment meets specified performance requirements
  - Performance/cost benefit analysis
  - Equipment procurement
- b) Typical approaches to planning and management
- c) Successful planning techniques
- d) Best practice management methods and styles

### **2.2.32 Renewable energy industry sector customs and practices**

Evidence shall show an understanding of renewable energy industry sector customs and practices to an extent indicated by the following aspects:

- a) Technical aspects of project planning and management encompassing:
  - Method of ensuring equipment meets specified performance requirements
  - Performance/cost benefit analysis
  - Equipment procurement
- b) Typical approaches to planning and management
- c) Successful planning techniques
- d) Best practice management methods and styles

### **2.2.33 Working in a Team**

Evidence shall show an understanding of the teams that may exist in the workplace, to an extent indicated by the following aspects:

a) Types of teams

Note.

Examples may include; Managerial, Administrative, Project-based, Commercial and Social

b) Roles, responsibilities and accountabilities of team members

Note

Examples may include; the role, responsibility and accountability of individuals, teams, organisational management, clients and the like.

c) Working in a team

Note.

Examples may include; Identification and utilisation of team member skills and knowledge; Maximising benefits of team diversity; Team planning; Team commitment and cooperation; Improving/Maximising team performance to achieve goals; Team monitoring and adjustment; Plain English literacy and communication; Leading, facilitating, participating, coaching, mentoring.

d) Working with clients

Note

Examples may include; client relations, client liaison, the practice of working with clients and the like.

e) Conflict resolution

Note.

Examples may include: Personality analysis tools, Strategies for dealing with difficult people and the like.

## 2.2.34 Scientific Writing and Communication

Evidence shall show an understanding of scientific writing and communication concepts and techniques and they apply in the workplace, to an extent indicated by the following aspects:

a) Types of scientific writing and communication

Note.

Examples may include: The distinguishing characteristics of the different types of scientific writing.

b) Purpose of the different types of scientific writing

Note.

Examples may include: Product development justification and specifications; Management advice; Scientific papers/publications; Conference/meeting presentations; Policy documents; Planning documents; Reports and the like.

c) Types of audience

Note.

Examples may include: The features and characteristics of an audience, including; an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'Plain English' written and oral communication.

d) Scientific writing techniques

Note.

Examples may include: The component parts of scientific documents, including: Aim, Materials, Method, Results, Discussion, Conclusion, References; The required content of each component part; Scientific referencing techniques, including: Bibliographies, Reference Lists, Citations, Footnotes, Quotes, and Acknowledgements; Scientific labelling techniques, including: Graphs, Tables, Diagrams, and Figures; Techniques for documenting results, including: Text, Graphs, Tables, Diagrams, and Figures; Organisational standards for document and presentation production, including: Standard organisational document templates, letterheads, headers, footers, and logos.

e) Oral communication techniques

Note.

Examples may include: Techniques for communicating to large groups, including; Conference presentations, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.

f) Electronic communication formats

Note.

Examples may include: World-wide Web – protocols and practices; Email – protocols and practices; Transfer of information via CD Rom/Floppy Disk; Use of PDF and other secure files.

g) Confidentiality considerations

Note.

Examples may include: Confidentiality practices to protect the organisation; Confidentiality practices

to protect the client; Confidentiality practices to protect providers of information/research cohorts.

### 2.2.35 Data Collection Techniques

Evidence shall show an understanding of data collection concepts and techniques as they apply in the workplace, to an extent indicated by the following aspects:

a) Data types

Note. Examples may include: Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.

b) Data Collection

Note.

Examples may include: Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, focus groups; Literature reviews, including; traditional and web-based; Group facilitation and presentation; Questioning, active listening and clarification; Obstacles to data collection, including; unavailable data, inconsistent data, confidentiality, security; Data limitations.

c) Evaluating data quality

Note.

Examples may include: Reliability; Accuracy; Clarity; Validity; Contribution to research; Relevance to research objectives.

### 2.2.36 Data Analysis and Presentation

Evidence shall show an understanding of data analysis and presentation concepts and techniques as they apply in the workplace, to an extent indicated by the following aspects:

a) Data analysis techniques

Note.

Examples may include: Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.

b) Data analysis technique selection

Note.

Examples may include: Determining the correct analysis technique(s); Determining the correct sequence of analysis techniques; Accommodating influencing factors including research objectives, budget, timeline and quality requirements, data limitations, confidentiality, security and the like.

c) Data interpretation

Note.

Examples may include: Determining results; Determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.

d) Data presentation encompassing:

- Determining the correct form of presentation for the audience, including; colleagues, scientific community, marketing and commercialisation specialists, general community, industry, mixed (i.e. conference audience).

Note.

Examples may include: Forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams, electronic formats; Forms of verbal presentation, including meetings, client briefings, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

### 2.2.37 Product Development and Trials

Evidence shall show an understanding of product development and trial concepts and techniques as they apply in the workplace, to an extent indicated by the following aspects:

- a) Identifying client and managerial requirements for production and trials
  - Note. Examples may include: Required outcome(s); Key performance indicators; Timelines; Financing; Resources; Quality Assurance and the like.
- b) Influencing factors
  - Note. Examples may include: Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements; Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like.
- c) Product development arrangements
  - Note.
  - Examples may include: Licensing agreements; Joint Ventures; Sole Ventures and the like.
- d) Relevant Documentation
  - Note.
  - Examples may include: Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- e) Development & trial processes
  - Note.
  - Examples may include: Proof of concept; Trialing concepts; Definitions/Specifications; Types of development and trial processes, including Phase A product and trial, Phase B product and trial, User trials, Ergonomics and Usability testing; Pre-defined acceptance criteria, confidence limits; Data collection & analysis; Production; Evaluation and recommendation formulation.

### 2.2.38 Intellectual Property Concepts

Evidence shall show an understanding of intellectual property concepts as they apply in the workplace, to an extent indicated by the following aspects:

- a) Intellectual Property and Australian Law
  - Note.
  - Examples may include: The place of Intellectual Property in Australian Law; Past cases and outcomes; Necessary considerations and the like.
- b) The nature of Intellectual Property
  - Note.
  - Examples may include: What is Intellectual Property?; What isn't Intellectual Property?; Why is Intellectual Property relevant?; What can Intellectual Property rights do?; What can't Intellectual Property rights do?
- c) Intellectual Property Rights
  - Note.
  - Examples may include: Patents; Copyright; Designs; Confidential Information; Other specialty rights and the like.
- d) Managing Intellectual Property
  - Note.
  - Examples may include: Identifying Intellectual Property; Deciding what to protect; Strategies for managing Intellectual Property; How can Intellectual Property rights work together?; Intellectual Property versus time, effort, finances; Sources of Assistance, including Publications, Intellectual Property professionals, Lawyers, Business Advisors, Marketing consultants and the like.
- e) Enforcement of Intellectual Property
  - Note.
  - Examples may include: The enforcement process; The role of lawyers; Resolution.
- f) The changing face of Intellectual Property
  - Note.
  - Examples may include: Development of Intellectual Property Right Laws; Changes to Intellectual Property Right laws; Extensions of Intellectual Property Rights into non-traditional areas, including

cultural, property arenas; The global marketplace and the like.

### 2.2.39 Commercialisation Concepts

Evidence shall show an understanding of commercialisation concepts and techniques as they apply in the workplace, to an extent indicated by the following aspects:

a) Commercialisation

Note.

Examples may include: Definition of commercialisation; Triggers for commercialisation; Past commercialisation successes; Past commercialisation failures; Triggers for commercialisation; Methods for identifying a good product/idea/service/application; Sources of assistance in regard to commercialisation, including documents; lawyers, business advisors, marketing consultants.

b) The commercialisation process

Note.

Examples may include: The concept; Does the concept fit with the organisation's goals? Is there a market, what is the market? Will the product meet the market requirements? Can the product be sold? How can the product be sold? Can the product be produced? How can the product be produced? Can the production be repeated?

c) Commercialisation arrangements

Note.

Examples may include: Sole venture; Joint venture; Licensing; Legal aspects of commercialisation.

d) Commercialisation planning

Note.

Examples may include: Costing; Marketing; Production/development; Distribution; Sales.

e) Competition

Note.

Examples may include: Who are the competitors? What are they doing and how quickly? Internal development relevant to competition.

f) Critical analysis of the commercialisation process for continuous improvement

Note.

Examples may include: Successes; Opportunities for improvement; Controllable influences; Uncontrollable influences; Formulation of recommendations.

### 2.2.40 Electrotechnology Industry organisations and practices

Evidence shall show an understanding of Electrotechnology industry organisations and practices to an extent indicated by the following aspects:

a) Electrotechnology vocations encompassing:

- Electrical
- Electronics
- Computer Systems
- Data Communication
- Refrigeration and Air Conditioning
- Instrumentation and Control
- Lifts

b) Career Paths in Electrotechnology encompassing:

- Australian Qualification Framework (AQF)
- Qualifications/Classifications
- Scope of work-installation, maintenance and servicing

- c) Training in Electrotechnology Vocations encompassing:
  - Traineeships, apprenticeships
  - Licensed Electrician minimum requirements
  - Career advancements
- d) Industry Organisations encompassing:
  - Employers
  - EE-Oz Training Standards and EE-Oz State/Territory Network
  - Employee – Trade union group (CEPU, ETU)
  - Government - ITABs, TAFE, RTO, ERAC
  - Private providers
- e) Qualification Requirements encompassing:
  - Unit of competency
  - Qualification assessments
- f) Policies and Practices in Electrotechnology Industry encompassing:
  - Licensing requirements
  - OH&S requirements
  - Awards
- g) Job Application encompassing:
  - Research
  - Writing
  - Methods of application
- h) Job Interview encompassing:
  - Preparation
  - Presentation
  - Evaluation

#### **2.2.41 Supervision fundamentals**

Evidence shall show an understanding of Electrotechnology industry organisations and practices to an extent indicated by the following aspects:

- a) Responsibilities of workplace supervisors
- b) Effective instruction methods
- c) Methods for seeking the cooperation of others
- d) Dealing with conflict

#### **2.2.42 Business Concepts**

Evidence shall show an understanding of basic business management concepts and techniques as they apply in the workplace, to an extent indicated by the following aspects:

- a) Basic business planning

Note.

Examples may include: Business plans; Performance plans; Strategic plans; Marketing plans and the like.

- b) Basic business administration

Note.

Examples may include: Access and equity principles and practices; Financial concepts; Awards and enterprise agreements; Legislation (OH&S, Environmental, Industrial, Anti-discrimination); Regulations; Australian Standards; Industrial specifications.

c) Basic business management

Note.

Examples may include: Codes of practice; Ethical standards; Quality Assurance; Innovation; Operation control; Customer service principles.

**2.2.43 Commissioning processes and procedures**

Evidence shall show an understanding of commissioning process processes and procedures to an extent indicated by the following aspects:

- a) Purpose of commissioning
- b) Commissioning planning and documentation
- c) Procedures for commissioning systems encompassing:
  - configuring
  - calibrating
  - tuning
  - validating system performance to specification
  - procedures followed to commission instrument systems
- d) Purpose and importance of documentation

**2.2 44 Requirements and methods for maintaining currency in industry developments**

Evidence shall show an understanding of requirements and methods for maintaining currency in industry developments to an extent indicated by the following aspects:

- a) Requirements to maintain currency in industry practices and products encompassing: any:
  - Regulatory
  - Industry
  - Professional/Association
  - Other
- b) Sources of information in industry changes and new developments encompassing:
  - Legislation and regulation
  - Technical Standards
  - Codes and industry/work practices and processes
  - Manufacture's product catalogues and instruction manuals
  - Industry Journals
  - Safety and environmental issues
- c) Currency of technology, machinery, equipment and tools applications and uses
- e) Acceptable methods of formally maintaining currency

Note.

1. Examples are formal industry refresher programs, industry seminars, product promotion programs and the like.

2. Acceptable methods may vary in different jurisdictions

**2.2 45 Responsibilities under a competency development plan**

Evidence shall show an understanding of responsibilities under a competency development plan to an extent indicated by the following aspects:

- a) Competency Development (Training) Plans encompassing:

- state/territories requirements (acts/regulations)
  - competency development (training) contracts
  - competency development (training) period
  - purpose of competency development (training) plans
  - process in developing competency development (training) plans
  - parties involved in the competency development (training) plan
- b) Qualification Structure encompassing:
- scope of work
  - training Packages - electrotechnology
  - competency standard units (CSUs)
  - structure of Qualification
  - off-Job Requirements
  - on-Job Requirements
- c) Responsibilities of Parties to the contract encompassing:
- employer responsibilities
  - learner responsibilities
  - RTO responsibilities
  - State Training Authorities (STA)
- d) Electrotechnology Industry Career Opportunities encompassing:
- industry Areas
  - qualification levels
  - career paths
- e) Industry customs and practices encompassing:
- industry bodies – employer and employee representatives
  - regulatory bodies – including licensing/registration, OHS, IR, training authorities – apprentice/trainee regulation
  - vocational and technical education system – Australian Qualification Framework (AQF), credentials, Australian Qualification Training Framework (AQTF)
- f) Monitoring of Workplace Evidence encompassing:
- workplace exposure and practices and relationship with competency standard units
  - methods of collecting workplace evidence
  - monitoring period cycle
  - requirements of workplace evidence
  - actions taken for unsatisfactory progression
  - role of state training authority (STA)
  - apprentice/learner responsibilities
  - employer responsibilities
- g) RTO Policies encompassing:
- apprentice/Learner Responsibilities
  - teachers/Trainers Responsibilities
  - absenteeism
  - off-Job component assessment specifications
  - on-Job component assessment specifications
  - qualification completion requirements and award
  - advanced standing and/or RPL
  - result review procedures
- h) Apprentice/Learner Discipline Policy encompassing:

- apprentices/Learners rights
  - apprentice/Learner responsibilities
  - breaches of discipline
  - types of penalties Apprentice/Learner Responsibilities
- i) Attendance at the Vocational and Technical Education Centre encompassing:
- importance of attendance
  - record management of attendance
  - attendance cards
  - advice to employer of absences
- j) Fire and Emergencies at the Vocational and Technical Education Centre encompassing:
- designated fire and emergency exists
  - procedures in the event of a fire
  - evacuation procedures
  - assembly points importance of attendance
- k) Occupational Health and Safety at the Vocational and Technical Education Centre encompassing:
- eye protection
  - foot protection
  - protective clothing
  - personal injuries
  - mobile phones and personal belonging
  - dress regulations
  - rotating machinery, designated fire and emergency exists
- l) Entry Requirements encompassing:
- numeracy requirements
  - literacy requirements
  - vocational and technical education centre support mechanisms
  - testing and appropriate action by learner Eye protection
- j) Vocational and Technical Education Centre Tour encompassing:
- vocational and technical education centre layout
  - building layout
  - tour of building and vocational and technical education centre

## **2.2 46 Methods of monitoring and reporting competency development activities**

Evidence shall show an understanding of methods of monitoring and reporting workplace activities indicated by the following aspects:

- a) RTOs responsibility to receive and monitor workplace activities of the apprentice/learner
- b) Industry requirements for monitoring workplace evidence
- c) Acceptable methods for monitoring and reporting workplace activities
- d) Apprentice's/Learner's responsibility to participate in the reporting of workplace activities
- e) RTOs requirements in periodically evaluating development of apprentices/learners from the workplace activities information gathered, and providing feedback and advice on areas requiring improvement
- f) Employers responsibilities to participate in monitoring, reporting and confirming workplace activities, and assisting in overcoming areas requiring development by the apprentice/learner

g) Options for appeal or assistance from RTO or State Training Authority (STA)

## 2.2 47 Electrotechnology engineering structures and occupations

Evidence shall show an understanding of electrotechnology engineering structures and occupations methods to an extent indicated by the following aspects:

- a) Structure and historical background of a specific engineering industry encompassing:
- Historical background of significant technological developments and changes in the student's particular engineering discipline and industry.
  - Types of organisations in the student's engineering industry:
  - Private industry and government enterprises
  - Size of organisations
  - Location and market.
  - Types of activities performed in student's industry:
  - Research and development
  - Design and consultancy
  - Manufacturing installation and commissioning
  - Servicing and maintenance.
  - Industry groupings and organisations; trade and industry support and professional bodies.
  - Engineering industrial practices of organizational controls/monitoring such as:
  - Budgeting and cost estimating processes
  - Setting production/service targets in terms of time, output and costs
  - Planning, coordination and control processes fundamentals, including such tools as PERT and project management charts.
  - Inventory controls of tools, stock and components
  - The tendering process, development of specifications and contracts
  - Application of industry standards
  - Quality control processes
- b) Engineering occupations and employment, education, training & retraining encompassing:
- Types of engineering occupations in student's particular engineering industry; job titles and descriptions, with reference to both private industry award re-structuring and government organizations where appropriate.
  - Qualification and training requirements for the occupations of the student's engineering industry.
  - Areas of employment opportunities and growth; careers; changes in engineering work practices and requirements.
  - Applying for employment in engineering occupations; interpreting job vacancy advertisements; appropriate forms of application; presentation of personal qualifications and experience; addressing the specified criteria of the vacant position.
  - Education and industry training structures and opportunities; school, TAFE, CAE, university; on-the-job experience; structure and accreditation of formal qualifications and recognition of prior learning.
  - Re-training requirements of technological, organisational and social change; industry restructuring and work practice change; career change and recurrent education.
  - Assessing future directions of change and the resulting impact on the student's particular industry and career path.

- c) Operating environment of Australian engineering industry encompassing:
- General and background operating environment of the student’s particular engineering disciplines and industry appropriate to the student’s workplace:
  - Technological environment including:
  - Legal environment
  - Education and training
  - Industrial relations
  - Political and public pressure groups
  - Economics/economic climate
  - Markets
  - Cultural/social
  - Ecological
  - Government factors
  - Customers/clients/end users of output
  - Product
  - Competitors
- d) Industrial Awards and Trade Unions encompassing:
- The nature, typical content and application of Australian industrial awards in the engineering workplace.
  - Trade union structures and membership in the engineering industries.

#### **2.2 48 Enterprise work activities policies and procedures**

Evidence shall show an understanding of enterprise work activities policies and procedures to an extent indicated by the following aspects:

- a) Need for policies and procedures
- b) Scope for an industry/enterprise to establish work activity policies and procedures
- Note.  
Example are policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development.
- c) Following work activities procedures

#### **2.2.49 Procedure and protocols for giving evidence in a court of law**

Evidence shall show an understanding of procedure and protocols for giving evidence in a court of law to an extent indicated by the following aspects:

- a) Process for responding to a witness summons
- b) Requirements for preparing to appear in court to give evidence
- c) Court procedures and protocols for giving evidence

## 2.3 Control technologies

### 2.3.1 Electrical control devices

Evidence shall show an understanding of control devices to an extent indicated by the following aspects:

- a) Contactors, relays and timers encompassing:
  - o Operating principles
  - o Basic contact configurations and identification
  - o Common applications
- b) Switches and push buttons encompassing:
  - o Switching configurations
  - o Common applications
- c) Solid state devices encompassing:
  - o Types of devices and their function
    - Note:  
Examples include soft starters, dimmers; smoke alarms, inverters, line conditioners and uninterruptible power supplies.
  - o Input and output parameters
  - o Risk control measure for isolating circuits when needed
  - o Risk control measure for preventing damage to devices during circuit testing.

### 2.3.2 Control circuit fundamentals

Evidence shall show an understanding of control circuit fundamentals to an extent indicated by the following aspects:

- a) Conversion of circuit diagrams from one form to another.
- b) Design and connection of basic control circuits
  - Note:  
Examples include multiple (light) switching circuits, master control circuit, stop-start circuit, remote stop-start circuit, time controlled circuit, interlocked circuit, jogging circuit (non-latching) and machine safety circuit.
- c) Sequence of operation of basic control circuits.

### 2.3.3 Process control principles

Evidence shall show an understanding of process control principles to an extent indicated by the following aspects:

- a) Control systems and components encompassing:
  - o open and closed loop systems,
  - o final element, process measuring, transmitters, converters, controllers,
- b) Control terminology encompassing:
  - o set point, offset, deviation, gain, proportional band, integral (reset), derivative (rate preact), process variable, feedback, conversion of gain to PB and vice versa and direct and reverse action.
  - o Integral - repeats/min and min/repeat
- c) Types of control encompassing:
  - o on/off control, proportional amplitude control, proportional time control, proportional plus integral control, proportional plus integral plus derivative control

and reset wind-up.

Note:

These include control action generation using R/C networks.

- d) Process characteristics encompassing:
  - o process lag, resistive lag, capacitive, dead time
- e) Response of systems to controller parameter (PI and D) changes and load change.

### **2.3.4 Pneumatic/hydraulic control tubing/piping**

Evidence shall show an understanding of pneumatic/hydraulic control tubing/piping to an extent indicated by the following aspects:

- a) Fittings and their use
- b) Control tubing/piping materials and sizes
- c) Working techniques encompassing:
  - o Cutting pipe tubing/piping
  - o Bending, shaping/setting pipe and tubing
  - o Joining connecting/terminating tubing/piping
  - o Cleaning
- d) Air cleaners and lubricants

### **2.3.5.1 Refrigerant pressure sensing controls**

Evidence shall show an understanding of refrigerant pressure sensing controls an extent indicated by the following aspects:

- a) Control systems and components encompassing:
  - o Refrigeration pressure sensing controls, including low and high
  - o Oil pressure controls and
  - o Defrost pressure controls
- b) Control terminology, symbols and diagrams/drawings
- c) Types of refrigerant pressure sensing controls, their operations, installation/replacement, setting adjustment and testing
- d) Refrigeration process characteristics and control parameters
- e) System responses to parameter changes

### **2.3.5.2 Refrigeration system controls**

Evidence shall show an understanding of refrigeration system controls to an extent indicated by the following aspects:

- a) Control systems and electrical/electronic components encompassing:
  - o Refrigeration controls, including thermostats, pressure controls, defrost controls
  - o Electrical controls, including timers, relays (starting and control), contactors, three phase motor starters
- b) Control terminology, symbols and diagrams/drawings
- c) Types of controls, their operations, installation/replacement, setting adjustment and testing
- d) Refrigeration process characteristics and control parameters
- e) System responses to parameter changes

### 2.3.6 Air conditioning system controls

Evidence shall show a basic understanding of simple air conditioning system control principles, concepts, terms and applications to an extent indicated by the following aspects:

- a) Control systems and components encompassing:
  - o Electrical controls,
  - o Electronics controls,
  - o Pneumatic controls,
  - o Direct digital controls
- b) Control terminology, symbols, drawings/diagrams
- c) Types of control, their basics operation, installation/replacement, commissioning, setting/adjustment and testing
- d) Air conditioning process characteristics and control parameters
- e) System responses to parameter changes.

### 2.3.7 Smart device basics

Evidence shall show an understanding of smart devices with embedded controls to an extent indicated by the following aspects:

- a) Types of devices and their function.
- b) Connection into a circuit.
- c) Entering and verifying instructions.

### 2.3.8 Programmable controller basics

Evidence shall show an understanding of programmable controller basics to an extent indicated by the following aspects:

- a) Regulatory requirement/limitations
- b) Basics of control system concepts encompassing:
  - o Input, process and output
  - o Relay control, static logic control and programmable control.
- c) Typical applications of PLCs
- d) PLC system components and arrangement
- e) Definitions and terminology encompassing:
  - o PLC, in/out (I/O), memory (RAM, ROM, E<sub>2</sub>PROM), CPU and power supply.
- f) Basic PLC operation encompassing:
  - o scan cycle, basic programming rules, addressing for I/O, and halt/run
- g) Connection of input and output devices.

### 2.3.9 PLC programming basics

Evidence shall show an understanding of the programming basics functions in PLCs to an extent indicated by the following aspects:

- a) Basic control system design methods
- b) Programming basics encompassing:

- Clearing memory
  - Using ladder format
  - Working with Boolean/mnemonic/statement
- c) Programming monitoring and editing basic control functions
- Note.  
Examples of basic control functions are Switching Latching, Timing, Counting, and Master control,

### 2.3.10.1 PLC programming

Evidence shall show an understanding of programming basics PLCs to an extent indicated by the following aspects:

- a) Extended control system design methods using ladder logic
- b) Advance discrete programming functions and controls encompassing:
- derived timers (off delay,
  - self resetting,
  - constant duty cycle),
  - reversible counters,
  - cascading timers,
  - cascading counters,
  - combining timers and counters,
  - internal relays/flags/markers,
  - latching relays (set/reset),
  - jump instructions,
  - master control instructions,
  - bit shift registers,
  - scan time considerations,
  - one shot,
  - retentive (power fail) functions,
  - simple step sequence instructions

### 2.3.10.2 PLC high level programming

Evidence shall show an understanding of high level programming of PLCs to an extent indicated by the following aspects:

- a) Medium to high level PLC encompassing:
- Hardware configuration
  - Software components
- Note.  
Examples of software components are, addressing (discrete, work and analogue), memory map, basic programming instruction syntax, file manipulation, documentation and saving/restoring programs.
- b) Number systems and codes encompassing:
- binary, octal, integer and hexadecimal
  - conversions between formats
  - common codes such as BCD, Grey, ASCII and the like
- c) Programming diagnostics encompassing:
- flags/status words (file)

- fault locations
  - scan considerations
  - fixed and variable parameters
  - immediate update
  - special internal relays (overflow bits)
- d) Data Manipulation encompassing:
- binary word structure
  - single and double words
  - word devices
  - arithmetic instructions, add, subtract, multiply, divide & square root
  - compare instructions
  - word logical instructions, AND, OR, EXOR)
  - conversions of BCD to binary, binary to BCD
  - indirect addressing
- Note.  
Examples are image register to word, word to IR, word to word, word to table and table to table
- word shift registers (LIFO FIFO)
  - masking
  - bit manipulation (bit set, bit clear, bit test)
  - entering data constants
  - multiplexing
- e) Analogue input/output encompassing:
- common signal types
  - module resolution
  - scaling
  - un-scaling
  - signal offset

### 2.3.10.3 PLC system applications

Evidence shall show an understanding of PLC system applications to an extent indicated by the following aspects:

- a) Alternative/enhancing programming methods
- b) System diagnostics techniques.
- c) Control loops encompassing:
  - Regulated loop control
  - Proportional / integral /derivative (PID) control
  - Applications of PID control
  - Methods used to achieve PID control using a PLC
- d) Specialist instructions
  - Note.  
Examples are interrupt driven applications, high speed counters, positional encoders
- e) Communications methods and requirements encompassing:
  - Common protocols and interface standards
  - Requirements when networking/interfacing PLC's
  - Communication mediums
  - Network types and topologies

- Hierarchical networks
- Peer to peer networks
- Handshaking
- Open architecture communications
- Remote I/O

f) Intelligent terminals/graphic interfaces installation and communication requirements

### **2.3.11 Control system network basics**

Evidence shall show an understanding of control systems networks to an extent indicated by the following aspects:

- a) Purpose and application of control system networks systems
- b) Open and common proprietary control system networks models (layers) and protocols

Note.

Examples of systems are CANopen, ControlNet, Devicenet, Ethernet, Foundation Fieldbus, Interbus, Modbus, Profibus.

- c) Control system networks interface.

### **2.3.12 Control network infrastructure**

Evidence shall show an understanding of control network infrastructure to an extent indicated by the following aspects:

- a) Data link layer encompassing:
  - Device types
  - Bus arbitration
  - Device initialisation
  - Synchronous / Asynchronous messaging.
  - Time management
  - Link active scheduler specific functions
- b) Bus monitor encompassing:
  - capturing
  - filtering
- c) Fieldbus message specification encompassing:
  - Virtual field device
  - Object dictionary
  - Communicate objectives
  - Communicate services
- d) High speed Ethernet encompassing:
  - Protocols
  - FDA agents
  - Messaging
  - Sessions
  - Time synchronisation
  - Redundancy

### **2.3.13 Using supervisory control and data acquisition systems**

Evidence shall show an understanding of supervisory control and data acquisition systems to an extent indicated by the following aspects:

- a) SCADA system features and applications encompassing:
  - Industries in which SCADA systems are used and
  - Associate benefits of the package.
  - Features and facilities of different SCADA packages.
  - Hardware requirements
- b) Reading mimics and animated graphics
- c) Trending encompassing:
  - Analysis of process to select data,
  - Viewing data and graphical representation of selected information
  - Trend graphs and data matching
- d) Alarm logging encompassing:
  - Analysing select data,
  - Corrective action of alarm status

### **2.3.14 Supervisory control and data acquisition systems programming**

Evidence shall show an understanding of supervisory control and data acquisition systems to an extent indicated by the following aspects:

- a) SCADA system networking encompassing:
  - PLC interface requirements
  - Networking requirements of the system
  - SCADA system differences from DCS
  - Costs of different software packages.
- b) Mimics and animated graphics encompassing:
  - Graphic designs balance of layout
  - Assessment of data required to be entered in software package
- c) Trending encompassing:
  - Analysis of process to select data, i.e., sampling of the process in terms of temperatures, time, weight, etc.
  - Viewing data and graphical representation of selected information
  - Trend graphs and data matching
- d) Alarm logging encompassing:
  - Analysing select data, applying limits and specification applied to processes
  - Corrective action of alarm status
- e) Recipes and scheduling encompassing:
  - Methods of producing libraries for different process conditions, required for varied production runs
  - Analysis of different production runs i.e., amounts of materials required, raw materials, pressure, temperature, weights, colour required in the process.
  - Alarm limits/material specifications
  - Scheduling, setting limits and evoking program changes.
- f) Data Collection and data basing encompassing:
  - Producing a data base of variables, and limit specifications involved in the process, i.e., individual items manufactures, or global manufactured products
  - Conversion of raw data into appropriate data basing software package Paradox,

Lotus, Excel

Note.

Examples of software packages are Paradox, Lotus, Excel and the like.

Reports encompassing:

- Types and layout of reports
- Aims of the reports, i.e., customer, manager/s, or accountant reports. The report may include information on statistical process control for quality assurance etc.
- Analysis of data in report i.e., graphs, design, layout, balance of layout etc.
- Assessment of data required for the report.

g) Programming language encompassing:

- Automate tasks within the software package.
- Provide complex processing, where field equipment does not have the facilities.

h) Implementation and applications encompassing:

- Overview of implementation of SCADA systems i.e. summary of points required for implementation.
- Typical application in manufacturing and data control i.e., food processing, packaging, automotive industry, energy management, steel production etc.

i) Networking encompassing:

- Types of networks available
- Coordinate and access of networking by linking to factory network.

### **2.3.15 Appliances, electronic controls and communications basics**

Evidence shall show an understanding of electronic controls and communications used in domestic appliances to an extent indicated by the following aspects:

a) Control systems and components encompassing:

- Appliance controls,
- Electrical/Electronic controls,

b) Control terminology

c) Types of control

d) Appliance characteristics and control parameters

e) System responses to parameter changes

f) Appliance integrated communications components and their function.

### **2.3.16 Integrated systems basics**

Evidence shall show an understanding of the basics of integrated systems to an extent indicated by the following aspects:

a) Systems purpose and principle of operation

b) Scope of control and inter working in integrated systems

c) System topology

d) Basic functions and programming methods using on screen 'icons and function and operating instruction lists.

### **2.3.17 Integrated systems, subsystem interworking**

Evidence shall show an understanding of subsystem interworking to an extent indicated by

the following aspects:

- a) Types of subsystems an integrated system
- b) Typical subsystem interworking scenarios
- c) Higher level functions and scripting (programming) methods.

### **2.3.18 Complex integrated system programming**

Evidence shall show an understanding of complex integrated system programming to an extent indicated by the following aspects:

- a) System complexities encompassing:
  - o Networked systems
  - o Extent of interworking subsystems
  - o System monitoring
- b) Advance integrated system programming methods

Note.

Examples of programming methods are those used in systems by AMX, Creston, C Bus, I Control and the like.

### **2.3.19 Control programming fundamentals**

Evidence shall show an understanding of control programming fundamentals to an extent indicated by the following aspects:

- a) Control applications of software
- b) Software terminology
- c) Programming languages currently used by industry
- d) Control system development encompassing:
  - o flowcharts
  - o pseudocode
  - o Nassi-Schneidemann charts
  - o algorithms
- e) Programming styles encompassing:
  - o programming structure
  - o documentation
  - o installing a language compiler
  - o using a text editor
  - o compiling source code
  - o generating executable files
  - o scalar and structured data types
  - o constants and variables
  - o reading from keyboard and writing to screen
  - o arithmetic, relational and logical operations
  - o making decisions using if/then, if/then/else, nested if/then and case
  - o looping operations using while/do, repeat/until and for/do
  - o programming to access external devices via I/O boards
  - o functions

Note.

Examples are macros; global and local variables, auto and static variables; Intrinsic functions used in control; Writing functions; Linking in external functions to control

- hardware
- numerical and character arrays

### **2.3.20 Microcontroller programming basics**

Evidence shall show an understanding of microcontroller control system programming methods to an extent indicated by the following aspects:

- a) Programming terms encompassing:
  - instruction
  - instruction mnemonic
  - operation code (op code)
  - address, operand, label, mnemonic and comment fields
- b) Language levels and their features encompassing:
  - machine code
  - assembly language
  - high level language types (in current use by industry) and their application
- c) Language simulators and emulators
- d) Assembler Language programming basics encompassing:
  - Programming input/output functions
  - Timing loops

### **2.3.21 Complex control systems**

Evidence shall show an understanding of complex control systems indicated by the following aspects:

- a) Control systems encompassing:
  - process controller and programmable controllers and personal computer
  - control peripherals suitable control
- b) Purpose built microprocessor controller multiple inputs resulting in different or changed outputs
- c) Different types and applications of system transducers and sensors
- d) Actuators and drive systems.

## 2.4 Communications and computer technologies

### 2.4.1.1 Telecommunications CPR regulations and installations

Evidence shall show an understanding of telecommunications CPR regulations and installations to an extent indicated by the following aspects:

- a) Telecommunication industry overview encompassing:
  - Telecommunications network
  - Act 1997
  - Role of ACA and ACIF
  - Telecommunications terminology
- b) Telecommunication technical standards encompassing:
  - ACA Technical Standards TS008, TS009
  - SAA Communications Cabling Manual (Restricted) (starter kit) as approved by relevant bodies – Standards Australia/ACIF
  - International Standards – ISO, IEC, ITU
  - Building Code of Australia (BCA)
  - AS/NZS 3000 Wiring Rules
  - National Association of Testing Authorities NATA
- c) Cabling Provider Rules (CPR) encompassing:
  - Australian Communications Authority (ACA)
  - Telecommunications Cabling Provider Rules
  - CPR registration
  - Old Telecommunication Licensing structures
  - Inspection of work
  - Documentation – TCA1 form
- d) Cable type and identification encompassing:
  - Cable types – unshielded twisted pair, shielded twisted pair, indoor, underground and aerial.
  - Cable construction
  - Cable identification – codes (colour, banded, numbered, lettered)
- e).Cable installation encompassing:
  - Cable damage
  - Cable packaging
  - Cable dispensing devices
  - Cable insertion and hauling
  - Lead-in conduit requirements (including wall box installation)
  - Wiring diagrams
  - Segregation of cables
  - Aerial cable fittings and additional safety aspects required.
- f) Termination of Telecommunication Cables encompassing:
  - Sheath stripping – methods, precautions
  - Pair identification
  - End to end testing
  - Filled cable termination
  - Termination systems – telephone outlets and sockets, network terminating devices

(NTD)

- Connector jointing eg. external to internal cable where required
- g) Telecommunication earthing and protection encompassing:
  - Customer lightning protection and (CLP) earthing
  - Carrier's policy requirement covering materials (including surge suppression devices) and practices (including earth bonding arrangements)
- h) Basic telephony encompassing:
  - Basic telephone service
  - Telephone
  - Exchange number
  - Connection equipment / lead in cable
  - Dialling signals – pulse dialling, tone dialling, ring equivalence number (REN)

#### **2.4.1.2 Telephone system fundamentals**

Evidence shall show an understanding of telephone system fundamentals to an extent indicated by the following aspects:

- a) The transmission of sound in a telephone system encompassing:
  - Function of telephone transmitters and receivers
  - Components and functions of the telephone
- b) Purpose of earthing and protection in a telephone system
- c) Customer Switching Systems encompassing:
  - Basic function
  - Difference between a key system and a PABX.
  - Advanced features
- d) Basic operations of System Distribution Frames (SDF)/Test Point Frames (TPF), power fail and line interface requirements (eg Indial, Rotary Groups, ISDN, Extension, Tie-line circuits)
- e) Types, purpose, use, and requirements of metering devices.
- f) Metering and installation arrangements of public/pay phones
- g) Installation methods and requirements encompassing:
  - Customer Switching Systems (CSS)
  - Interfacing equipment
  - Termination of CSS equipment
- h) Requirements for programming of CSS
- i) Hazard associated the electronic components of CSS encompassing:
  - Static discharge
  - Chemical damage
  - Mechanical damage
  - Electromagnetic Interference

#### **2.4.1.3 Telephone network facilities**

Evidence shall show an understanding of telephone system fundamentals to an extent indicated by the following aspects:

- a) Network subsystems (i.e. functional blocks) components and operating parameters
- b) Switches within the network

- c) Customer accesses infrastructure
- d) System security

#### 2.4.1.4 Lift telecommunications cabling regulations and installation

Evidence shall show an understanding of lift telecommunications cabling regulations and installation to an extent indicated by the following aspects:

- a) Regulations and Standards
  - registration of Cablers
  - standards
  - record keeping (cable records)
  - lift boundary
- b) Telecommunication lift cables and termination methods
  - cables identification
  - types of cables (round travelling cable, flat travelling cable)
  - cable wire identification (colour codes)
- c) Installation methods of communication cabling
  - requirements
  - cable installation and cable stripping
  - termination (solder, screw, insulation crushing screw, insulation displacement)
  - segregation
  - cable protection methods
- d) Testing of communication cabling
  - types of tests (continuity, correct sequence, revised pair, transposed or split pair and insulation resistance)
  - test equipment

#### 2.4.2.1 Telecommunication earthing and protection

Evidence shall show an understanding of telecommunication earthing and protection to an extent indicated by the following aspects:

- e) Telecommunication overvoltage protection system
  - Operating principles
  - Overvoltage and surge/spike suppression protection techniques
  - Overvoltage protection devices
  - Installation of overvoltage protection systems
- f) Earthing protection system encompassing:
  - Components and arrangement of the MEN system
  - TELEX functional earth system
  - Telecommunication system earthing single and multi-storey
  - Communication earth system
  - Protective earth barriers for segregation, cable tray, duct and metal equipment enclosures
- g) Electrical interference encompassing:
  - Types – RFI, EMI
  - Sources of interference

- Techniques in reducing interference
- Earthing cable shields
- h) Earth testing instruments and procedure
- i) Safety issues to be considered with earthing and bonding

#### **2.4.2.2 Voice and data cabinet assembly and terminations**

Evidence shall show an understanding of voice and data cabinet assembly and fit out, to an extent indicated by the following aspects.

- a) Internal cable routing and management provisions
- b) Ventilation requirements
- c) Cabinet structure encompassing:
  - internal framework
  - cable entry
  - removable panels
  - multiple cabinets
  - doors, locks and hinges
  - mounting rails
  - access to equipment and cabling
  - earthing arrangements and methods
- d) Mounting requirements for components that include
  - rack Units
  - patch panels
  - routers
  - servers

#### **2.4.3.1 Data communication fundamentals**

Evidence shall show an understanding of data communications fundamentals to an extent indicated by the following aspects:

- a) Process of data transmission encompassing:
  - codes used in data communications
  - asynchronous and synchronous transmission
  - bits per second and baud rate
  - DCEs and DTEs.
  - error control, parity and CRC.
- b) Characteristics and limitations of the types of transmission media encompassing:
  - information as a quantity.
  - information content of symbols.
  - redundancy in communications.
  - common types of media used in data communications: twisted pair, coaxial.
  - other communication systems: HF radio, satellite and cellular.
- c) Simple protocols encompassing:
  - reason for protocols.
  - simple protocols: teletype, X modem, half-duplex and full duplex.
- d) Types, characteristics and limitations of modems and interface standards encompassing:

- operation and types of modems
    - Note:
    - Examples include serial, parallel, USB, firewire, broadband, ADSL, cable modems
  - modulation techniques: FSK, PSK and QAM.
  - interface and signalling standards:
    - Note:
    - Examples include RS232, V.24, Current loop, RS422, RS423, RS449, RS485, V35, X21 and G703.
  - Limitations interface standards, speed and distance.
- e) Types, characteristic specifications and limitations of fibre optic systems encompassing:
- fundamentals of light and how it travels in a fibre.
  - typical fibre composition, multimode and single mode propagation
  - laser and other light sources and detectors.
  - fibre cable and splice fibre cable.

#### **2.4.3.2 Networking fundamentals**

Evidence shall show an understanding of networking fundamentals to an extent indicated by the following aspects:

- a) Analogue and digital signals encompassing:
  - How information is carried
  - Signal distortion
    - Note.
    - Examples include attenuation, reflection, noise, dispersion, jitter, latency and collisions
- b) Types of networks, network components and hardware
- c) Local Area Network (LAN) architectures
- d) Networking protocols and the OSI model
- e) Network signal propagation
- f) Transmission Control Protocol / Internet Protocol (TCP/IP)
- g) Basics of Encoding Networking Signals
- h) Internet services

#### **2.4.4 Wireless networks infrastructure**

Evidence shall show an understanding of wireless networks infrastructure to an extent indicated by the following aspects:

- a) Wireless components
- b) Network configurations
- c) Wireless network security

#### **2.4.5 Wide area networks infrastructure**

Evidence shall show an understanding of wide area networks infrastructure to an extent indicated by the following aspects:

- a) Network communication media
- b) Network servers
- c) Network configurations
- d) Network security

#### **2.4.6 PABX fundamentals**

Evidence shall show an understanding of PABX fundamentals to an extent indicated by the following aspects:

- a) Programming methods
- b) Configuration options
- c) Programming options

#### **2.4.8 Switches, hubs and routers**

Evidence shall show an understanding of switches, hubs and routers to an extent indicated by the following aspects:

- a) Purpose and function
- b) Circuit configurations
- c) Connection arrangements
- d) System protocols

#### **2.4.9 Decoders**

Evidence shall show an understanding of decoders to an extent indicated by the following aspects:

- a) Purpose and function
- b) Circuit configurations
- c) Connection arrangements
- d) System protocols

#### **2.4.10 Reserved**

#### **2.4.11 Personal computers, hardware structure**

Evidence shall show an understanding of personal computers, hardware structure to an extent indicated by the following aspects:

- a) Structure and components and their function

Note:

Examples include motherboards, memory modules, video modules, connecting buses, storage devices and the like.

- b) Assembling and dismantling techniques
- c) Hardware faults and troubleshooting techniques

Note:

Confined to subsystem level

- d) Basic network hardware and components
- e) Connection of network media
- f) Set up of standard network configuration

#### 2.4.12.1 Computer hardware sub-assemblies

Evidence shall show an understanding of computers, hardware components to an extent indicated by the following aspects:

- a) Sub-assemblies architecture and their function
- b) Sub-assemblies faults and troubleshooting techniques
- c) Repair techniques

#### 2.4.12.2 Multimedia computer components

Evidence shall show an understanding of computer multimedia subsystem components to an extent indicated by the following aspects:

- a) Multimedia subsystems

Note:

Examples include new multimedia standards, pixel resolution, scanning, resolution, output resolution, printer resolution, microprocessor speeds, INTEL INCOMP Index rating, cache memory speeds, system bus transfer speeds, configure a mother board, trouble shoot a mother board

- b) Multimedia storage devices

Note:

Examples include USB/flash, hard disk drive, multimedia storage devices, removable storage hard disk drive, CD-ROM/DVD drive, digital tape (DAT) drive

- c) Video cards, types and specifications

Note:

Examples include video processor, graphic processing, video RAM, bus interferences, resolution, full motion video, still image, driver software and updates

- d) Sound cards and sound card standards

Note:

Examples include MIDI interface, sound card applications, sound card connectors, FM synthesis, wave table, sound card file formats

- e) CD-ROM's, CD-ROM/DVD standards

Note:

Examples include CD-ROM/DVD cache memory, CD-compatible, CD/DVD drive transfer speeds, CD-ROM/DVD interfaces, photo CD/DVD compatible, CD/DVD recordable, multi-session compatible.

- f) Colour printers

Note:

Examples include types of colour printers, construction and operation, dot matrix, ink-jet, laser, dye sublimation.

- g) Colour scanners

Note:

Examples include types of scanners, construction and operation, drivers and scanning software

#### 2.4.13 Computer peripherals

Evidence shall show an understanding of computer peripherals to an extent indicated by the following aspects:

- a) Types and applications
- b) Operating principles
- c) Software (drivers) installation
- d) Network management of peripheral devices.

#### **2.4.14 Personal computer operating systems, basics**

Evidence shall show an understanding of personal computer operating systems to an extent indicated by the following aspects:

- a) Basic function, components and concepts.
- b) Operating systems in use.
- c) System installation and configuration

#### **2.4.15 Computer operating systems**

Evidence shall show an understanding of computer operating systems to an extent indicated by the following aspects:

- a) Operating system components and structure
  - Note:  
Examples include relevant versions of DOS, Windows and UNIX variants.
- b) System installation and configuration
  - Note:  
System installation includes drivers and internet access and simple networking
- c) File structure and management
- d) System tools
  - Note:  
Examples include control panels, wizards and the like
- e) Operating systems malfunctions and solutions
- f) Troubleshooting techniques.

#### **2.4.16 Personal computers, engineering applications software basic**

Evidence shall show an understanding of computers applications to an extent indicated by the following aspects:

- a) Application software types
  - Note:  
Examples include Apparatus set up and calibration, Electronic Design Automation system, Aided Design, Engineering data analysis software, Engineering modelling, Project management and the like.
- b) Configurations and preferences
- c) Use of particular software packages
  - Note:  
Examples include word processor, spreadsheet, database, presentation software, web/document publisher, CAD/drawing packages, email client, business management

#### **2.4.17 Servers**

Evidence shall show an understanding of Servers to an extent indicated by the following aspects:

- a) Types and applications
  - Note:  
Examples include redundant array of independent disks (RAID),
- b) Software installation and configuration
- c) Access and security
- d) Adding hardware and upgrading

#### **2.4.18 Business equipment software basics**

Evidence shall show an understanding of business equipment software to an extent indicated by the following aspects:

- a) Programming methods
- b) Configuration options
- c) Administration and maintenance functions

#### **2.4.19 Gaming equipment communications**

Evidence shall show an understanding of gaming equipment communications to an extent indicated by the following aspects:

- a) Online and stand alone systems
- b) Common gaming networks
- c) Linked jackpot networks
- d) Player tracking systems

#### **2.4.20 Programming elements**

Evidence shall show an understanding of the programming elements to an extent indicated by the following aspects:

- a) Algorithm Design encompassing:
  - o Problem Definition
  - o Steps in Problem-Solving
  - o Modular Design
  - o Top-Down Design
  - o Flow-Charts and Structured Programming
  - o Pseudo-Code
  - o Filtering allowable Data Input
  - o Using standard Input & Output methods
  - o Object-Oriented Design (brief intro.)
  - o Documentation Rationale
  - o Acceptable Documentation Method
- b) Machine-Code, Assemblers and Compilers
- c) Brief History of Languages & Limitations
- d) Parameters of different programming languages encompassing:
  - o Constants and variables
  - o Data types and declarations
  - o Logical flow control
  - o Detecting breaches of structure
  - o Documentation instruction examples
  - o Procedures and function calls
  - o Parameter-passing
  - o Local and global variables
  - o Object-oriented methods

- o Classes and objects,
  - o encapsulation and inheritance.
  - o Visual programming methods
  - o General-purpose program libraries
- e) Data structures encompassing:
- o Records
  - o Arrays
  - o File Input/Output
- f) Testing and validation encompassing:
- o Sequencing the process
  - o Inconsistencies detection
- Note,  
An examples is comparing code to documentation, commonly called “Desk-Checking’.
- o Test data selection
  - o Modular testing & debug
  - o Problems with using non-standard methods for data input and output.
  - o Common bugs

#### **2.4.21 Client side programming**

Evidence shall show an understanding of client side programming the to an extent indicated by the following aspects:

- a) Client server architecture
- b) Hyper Text Markup Language (HTML) encompassing:
- o Forms
  - o Table
  - o Cascading style sheets
- c) Hyper Text Markup Language (HTML) scripting encompassing:
- o Exposed object model
  - o Events and event handling
  - o Objects methods, properties, events
  - o Window, document, form, and form elements
  - o String object, methods, properties
  - o Form field validation
- Note:  
Examples of scripting language are JavaScript and Visual Basic (VB) Script
- d) Extendable Markup Language (XML) encompassing:
- o Syntax
  - o Structure (well formed XML)
  - o Schemas
  - o Transformations
  - o Parsing Document Object Model (DOM) and Simple API (SAX)
  - o Scripting to Document Object Model (DOM)
- e) Extendible Stylesheet Language (XSL) generating HTML from XML
- f) Wireless thin client programming
- Note.  
Examples include Java2 Micro Edition (JEME), Mobile Information Device Profile (MIDP), Windows CE and Palm OS

- g) Consideration for system architecture
- h) Configurations and profile overview

#### **2.4.22 Server scripting**

Evidence shall show an understanding of server scripting the to an extent indicated by the following aspects:

- a) Client server architecture
- b) Web and Application Servers
- c) Server scripting languages eg. JSP, ASP, PHP, Perl
- d) Server script Tags
- e) Integrating script with HTML
- f) Server script object model
- g) Request, Response, Session, Application
- h) Using server objects
- i) Server components
- j) Using components in server scripts
- k) Scope of server components eg. session, page, application
- l) Component get / set methods
- m) Deploying server components
- n) Advanced server scripting concepts

#### **2.4.23 Database access**

Evidence shall show an understanding of database access to an extent indicated by the following aspects:

- a) Relational Databases encompassing:
  - o Tables, keys, design rules and normalisation
  - o Database management utilities
    - Note.
    - Example include MSSQL, MYSQL and Access
- b) Structural query language (SQL) queries encompassing:
  - o Select, insert, update and delete processes
  - o Application of conditionals ‘where’, ‘distinct’ and ‘like’
  - o Create and dropping tables
- c) Data Base connectivity components encompassing:
  - o Drivers, data sources
  - o Database connectivity component loading
  - o Query connection and execution
  - o ResultSets / RecordSets
  - o Rows, columns, cursors, concurrency, pooling
  - o Iterating through ResultSets / RecordSets
    - Note.
    - Example include ODBC, JDBC, ADO

#### **2.4.24 Web applications and services**

Evidence shall show an understanding of web servers to an extent indicated by the following aspects:

- a) Comparison of HTTP servers and platforms  
Note.  
Examples include IIS and Apache
- b) Comparison of Application servers and platforms  
Note.  
Examples include J2EE / tomcat, .NET
- c) HTTP Servers encompassing:
  - o Installation requirements and methods
  - o Security configuration
  - o Content publishing and security
- d) WEB application technologies encompassing:
  - o Server installation and deployment
  - o Security
- e) Server scripting technologies encompassing:
  - o WEB application installation and deployment
  - o Application server administration
- f) Web services overview encompassing:
  - o WEB services XML, API, RPC
  - o XML API processing
  - o XML DOM
  - o SOAP (simple object access protocol)
  - o WEB Services Security

#### **2.4.25.1 Local area network fundamentals**

Evidence shall show an understanding of local area network fundamentals to an extent indicated by the following aspects:

- a) The OSI model for computer system interconnect
- b) General principle of Local Area Network (LAN) encompassing:
  - o benefits of a LAN.
  - o the elements of a LAN.
  - o the different types of network topology and their applications.
- c) Cabling and termination arrangements for a LAN system and define all the hardware requirements encompassing:
  - o Network standards:  
Note.  
Examples are 10/100 BASE T and 10/100 BASE F.
  - o Applications of different types of coaxial cable, twisted pair, optical fibre cable and microwave as the transmission medium for a LAN.
- d) Multiple access units and their function  
Note.  
Examples are hubs, switches, routers and the like
- e) LAN Standards  
Note.  
Examples are Ethernet (IEEE 802.3) Token Ring (IEEE 802.5).
- f) Basic principle of medium access methods such as polling, token passing and CSMA/CD.

- g) Current network operating systems available for establishing a LAN encompassing:
  - Network protocols
  - Concepts of TCP/IP addressing
  - Peer-to-peer and server based
  - Establishing workgroups.
  - File and device sharing
- h) Network hardware installation methods encompassing:
  - Installing network card
  - Installing hubs switches and routers
- i) Concepts and the hardware required for internet and worldwide web working LANs
- j) Network software installation and configuration methods encompassing:
  - Loading and configuring operating software
  - Installing and configuring the network card
  - Setting up user accounts and permissions
  - Establishing security
- k) Network testing and diagnostic tools and methods

#### 2.4.25.2 Network services design processes

Evidence shall show an understanding of network services processes to an extent indicated by the following aspects:

- a) Analysis of business requirements encompassing:
  - Existing and planned business model and organisational structure.
  - Factors impacting on the design
    - Note.
    - Examples include priorities, growth, growth strategy, regulatory framework, risk, and cost.
  - IT management structure
- b) Analysis of technical requirements encompassing:
  - Evaluation of the company's existing and planned technical and environment goals
    - Note.
    - Examples include company size, user and resource distribution, various site connectivity, bandwidth, service performance, availability and scalability, data and system access patterns, network roles and responsibilities and security considerations
  - Evaluation of the company's existing and planned technical and environment goals
    - Note.
    - Examples include current resources, services, network infrastructure, protocols and hosts, Transmission Control Protocol / Internet Protocol (TCP/IP), hardware, planned upgrades, support and network and systems management
  - Client access, end-user work needs and usage patterns
  - Disaster recovery requirements
- c) Design of a network infrastructure encompassing:
  - Network topology
  - TCP/IP networking strategy
    - Note.
    - Examples include Internet Protocol (IP) subnet requirements, addressing and implementation plan, measurement and optimisation of a TCP/IP design, software routing integration and TCP/IP Wide Area Network (WAN) integration.
  - Dynamic Host Configuration Protocol (DHCP) strategy
    - Note.
    - Examples include DHCP in a routed environment, an operating system remote locations

- service and measurement and optimisation of a DHCP infrastructure design
- o Name resolution services
  - Note.  
Examples include integrated Directory Name Service (DNS) and secure DNS, highly available DNS, DNS deployment strategy, other systems providing naming services such as Windows Internet Naming Services WINS and their secure naming services, deployment strategy and the measurement and optimisation of DNS and other naming services
- o Multi-protocol strategy
  - Note.  
Examples include Internetwork Packet Exchange / Sequenced Package Exchange (IPX/SPX) and Systems Network Architecture (SNA)
- o Distributed File Strategy
  - Note.  
Examples include placement of Dfs root and Dfs root replica strategy
- d) Design of internet connectivity encompassing:
  - o Internet and extranet access
  - o proxy server, firewall, routing and remote access, Network Address Translation, connection sharing, web sharing and web or mail server
  - o Load balancing strategy
- e) Wide Area Network (WAN) infrastructure encompassing:
  - o Dial-up remote access design
    - Note.  
Examples include routing and remote access and integration of Remote Authentication Dial-in User Service (RADIUS)
  - o Virtual Private Network (VPN) design
  - o Routing and Remote Access design incorporating demand dial strategy
- f) Design of a management and implementation strategy encompassing:
  - o Management strategy
    - Note.  
Examples include strategy for monitoring and managing network services such as global catalogue, lightweight Directory Access Protocol, Services, Certificate Services, DNS, DHCP, WINS, Routing and Remote Access, Proxy Server and Dfs
  - o Network services that support application architecture
  - o Interaction between network services and DNS, DHCP and WINS
  - o Resource strategy

#### 2.4.26 Network services management processes

Evidence shall show an understanding of network services management processes to an extent indicated by the following aspects:

- a) Management of print, file and web resources encompassing:
  - o Directory services
    - Note.  
Examples include publishing resources, performing searches and configuring a printer object
  - o Data storage
    - Note.  
Examples include NTFS and FAT file systems eg New Technology File Systems (NTFS) and File Allocation Table (FAT), quotas, Encrypting File Systems, configuring volumes and basic and dynamic disks, file and folder permissions and compression and domain-based distributed file systems
  - o Shared resources
    - Note.

Examples include folders, web sharing, folder permissions, printers and printer permissions

- Internet Information Services

Note.

Examples include configuring virtual directories and servers, internet and intranet browsing, authentication and Secure Sockets Layer (SSL), File Transfer Protocol (FTP) services and access permissions for intranet server

- Network security

Note.

Examples include user account lockout settings, password management, Group Policy to run logon scripts and link objects, auditing and security log file

b) Troubleshooting the network infrastructure

- Routing

Note.

Examples include using the tracert, route, arp, ping, pathping and ipconfig utilities

- Transmission Control Protocol / Internet Protocol (TCP/IP)

Note.

Examples include configuring TCP/IP properties, using the winipcfg, ipconfig and arp commands and connectivity using ping

- DHCP

Note.

Examples include unauthorised DHCP servers detection, DHCP authorisation, dynamic IP addressing, configuring DHCP properties and creating configuring a DHCP scope

- Domain Name Service (DNS)

Note.

Examples include configuring DNS server properties, managing DNS database records such as CNAME, A and PTR and creating and configuring DNS zones

- Name resolution using nbtstat, ipconfig, nslookup and netdiag commands, Host file and Lmhost files creation and configuration.

c) Troubleshooting Servers encompassing:

- Installation and configuring of server and client computer hardware

Note.

Examples include hardware compatibility using qualifies tools, driver signing options, digital signatures on driver files and systems support for legacy hardware devices

- Starting servers and client computers including, Safe Mode, Recovery Console, parallel installations, startup log file, repairing operating systems using startup options, recovery console, recovering data from hard disk and restoring from back up

- Use of System Monitor, Event Viewer and Task Manager

- Updates

Note.

Examples include service packs, hot fixes and security hot fixes

d) Directory service infrastructure encompassing:

Note.

Examples of directory service infrastructure are Active Directory, Organisational Units and Group Policy

- Creation, management and troubleshooting of User and Group objects

Note.

Examples include computer accounts, groups configuring accounts via a directory service, searching for objects, use of templates for creating user accounts and resetting accounts

- Managing objects and container permissions

Note.

Examples include Delegation of Control Wizard and active control lists.

- Diagnosis of directory service replication problems

Note.

Examples include those related to Wide Area Network (WAN) link connectivity,

- replication, latency, duplicate objects and LostandFound container
  - Group Policy
    - Note.
    - Examples include deploying software, Windows Installer, updates and assigning and publishing applications
  - Troubleshooting End-User Group Policy
    - Note.
    - Examples include problems involving precedence, inheritance, filtering and NO Override option and manual refreshing of Group Policy
  - Implementation and management of security through Group Policy
    - Note.
    - Examples include security templates, seccedit commands, Security Configuration and Analysis and modification of domain security policy to comply with corporate standards
- e) Remote Access encompassing:
- Configuration, management and troubleshooting remote access and VPN connections
    - Note.
    - Examples include protocols such as client to client Point to Point Tunnelling Protocol (PPTP) and Layer Two Tunnelling Protocol (L2TP) connections, verification of security of VPN connections, configuration of client computer remote access properties, name resolution and IP address allocation.
  - Troubleshooting remote access policy
    - Note.
    - Examples include diagnosis of problems with remote access policy priority, user account, group membership and nested groups, creation and configuration of remote access policies and profiles and selection of encryption and authentication protocols
  - Implementation and troubleshooting of Terminal Services for remote access
    - Note.
    - Examples include configuring Terminal Services for remote administration or application server mode and local resource mapping and user properties
  - Configuring and troubleshooting Network Address Translation (NAT)
    - Note.
    - Examples include configuration of routing and remote access to perform NAT and troubleshooting Internet Connection Sharing problems by using the ipconfig and ping commands.

#### 2.4.27.1 Unix fundamentals

Evidence shall show an understanding of Unix fundamentals to an extent indicated by the following aspects:

- a) UNIX operating systems encompassing:
- Overview of basic function, components and concepts of computer systems and operating systems
  - History of UNIX and flavours of UNIX
  - UNIX administrators role
- b) Accessing UNIX and common desktop environment encompassing:
- User Accounts
  - Desktop environment
  - Customising using Style Manager
  - Sub-panels
- c) Graphical User Interface (GUI) Applications encompassing:
- Using Mail Tool, Calendar Manager and other applications
  - Using GUI help and other help systems
  - Troubleshooting

- d) Accessing files and directories encompassing:
  - File system structure and navigation
  - Pathnames
  - Listing directory contents
  - Identifying and using meta-characters
- e) Directory and file management encompassing:
  - Using Command Line
  - Using File Manager
- f) File and user information utilities encompassing:
  - File systems
  - File processing commands
  - Users
  - Scripting
- g) File security encompassing:
  - Overview of security concepts and functions
  - Permissions
  - Changing permissions with Command Line and File Manager
- h) Printing encompassing:
  - Command line printing
  - Print manager, print status and queue
  - Printing from File Manager
- i) Backup and restoring data encompassing:
  - Overview of back up and restoring strategies
  - Using tar utility to perform file storage
  - Compression tools
  - Using jar command
  - GUI backup tools
- j) System processes and memory management encompassing:
  - Processes and PIDs
  - Terminating a process
  - Memory management
- k) Korn and C Shells encompassing:
  - Overview of shell
  - Korn Shell features
  - C Shell Features
  - Shell Feature Comparison
- l) Customisation encompassing:
  - Overview of customisation
  - Initialisation files
  - Shell customisation
  - GUI customisation
- m) Network Basics encompassing:
  - Client – Server
  - Network commands
  - NIS+ and NFS+

### 2.4.27.2 Linux fundamentals

Evidence shall show an understanding of Linux fundamentals to an extent indicated by the following aspects:

- a) Linux operating systems encompassing:
  - o System Installation
  - o Examining and recording hardware details
  - o Disk partitioning
  - o Standalone installation from a CDROM
  - o Multi-boot installation and boot managers
  - o Network installation
- b) Work on the command line
  - o Using a shell
  - o Navigating and managing the filesystem
  - o Streams, pipes and redirects
  - o Manipulating text and basic regexes
  - o Text editors
  - o Managing and monitoring processes
- c) Networking
  - o Setup a host to connect to a LAN
  - o Use command line network tools
  - o Use networking protocols to connect to other hosts on the LAN—ssh, ftp, telnet, talk, finger etc.
  - o Share files over the network using nfs.
  - o Running X over a network
- d) X window system
  - o X configuration
  - o Window manager configuration
  - o Configuring and using a display manager
  - o Using X over a network
- e) Using Applications
  - o Installing applications using a package manager installing software from source tarballs
  - o Using command line applications
  - o Using GUI applications
- f) Installing and managing server software
  - o Setting up servers for a variety of protocols
  - o Managing access to servers

### 2.4.27.3 Mac OSX fundamentals

Evidence shall show an understanding of Mac OSX fundamentals to an extent indicated by the following aspects:

- a) Mac OSX operating systems encompassing:
  - o System structure and component functions
  - o System Installation
  - o Setting user preferences

- b) Security encompassing:
  - o Setting up multiple user accounts
  - o Role and function of Keychain
- c) Networking/internet set up procedures
- d) Installing applications software
- e) Installing and managing server software encompassing:
  - o Setting up servers for a variety of protocols
  - o Managing access
- f) Using 'Terminal'

#### 2.4.28 Network operating systems essentials

Evidence shall show an understanding of network operating systems to an extent indicated by the following aspects:

- a) Installation of a personal computer operating system encompassing:
  - o Attended and unattended installation
  - o Server Remote Installation Services
  - o System preparation tool
  - o Use of attended answer files created using Set-up Manager
  - o Upgrading from previous versions of operating systems
  - o Applying update packs and deploying service packs
  - o Failed installations troubleshooting techniques
- b) Personal computer operating system administration encompassing:
  - o File compression
  - o Permissions
  - o File and folder optimisation
  - o Shared folders and web server resources
  - o Printers and print jobs
  - o File system configuration and management
- c) Installation, configuration, management and troubleshooting of hardware devices encompassing:
  - o Disk devices
  - o Removable media devices
  - o Display devices
  - o Mobile computing hardware
  - o Multiple processing units
  - o Network adaptors
- d) Installation, configuration, management and troubleshooting of input / output devices encompassing:
  - o Printers, scanners keyboard, smart card and the like
  - o Multimedia hardware
  - o Modems
  - o Devices connected by differing media
    - Note.
    - Examples are wireless, USB and Firewire.
- e) Managing and troubleshooting system performance and reliability encompassing:
  - o Driver signing

- Task scheduler
  - Offline file synchronisation
  - Optimising memory, processor utilisation, disk, network and application performance
  - Hardware profiles
  - Backing up and restoring data
  - Safe mode and recovery console
- f) Configuring and troubleshooting the desktop environment encompassing:
- Multiple users
  - Multiple languages and locations
  - Configuring local settings
  - Managing applications using installer packages
  - Desktop settings
  - Fax support and accessibility services
- g) Network Protocols and Services encompassing:
- Transmission Control Protocol / Internet Protocol (TCP/IP)
  - Connecting computers by a virtual private network (VPN) connection
  - Dial up connection to remote access server
  - Connecting to the internet
  - Managing internet connection sharing
  - Connecting shared resources on a network
- h) Implementing, monitoring, managing and troubleshooting security encompassing:
- Data encryption using Encrypting File System
  - Local security policy
  - Local user accounts
- Note.  
Examples are audits, creating accounts, account settings, user rights and policy
- User authentication
  - Security configuration

## 2.4.29 Network operating systems implementation

Evidence shall show an understanding of implementing network operating systems to an extent indicated by the following aspects:

- a) Installation of server software encompassing:
- Attended and unattended installation
  - Server Remote Installation Services
  - System Preparation Tool
  - Use of attended answer files created using Set-up Manager
  - Upgrading servers from previous versions of the operating system
  - Applying update packs and deploying service packs
  - Failed installations troubleshooting techniques
- b) Installing, configuring and troubleshooting access to resources encompassing:
- Network services
  - Printers
  - Files and folders
  - Standalone and domain based Distributed File System

- File and folder security
- Web access to files and folders
- Access to internet
- c) Configuration and troubleshooting of hardware devices and drivers encompassing:
  - Hardware devices
  - Driver signing options
  - Updating drivers
- d) Managing and troubleshooting system performance, availability and reliability encompassing:
  - Monitoring and optimising systems resources
  - Managing process
  - Optimising disk performance, systems state data and user data
  - Backing up and restoring data
  - Safe mode and Recovery Console
- e) Managing, configuring and troubleshooting the storage encompassing:
  - Disks and volumes
  - Data compression
  - Monitoring and configuring disk quotas
  - Disk failure and recovery
- f) Installation, configuration and troubleshooting network connections encompassing:
  - Shared access
  - Connecting computers by a virtual private network (VPN) connection
  - Network protocols and services
  - Remote access connection, policy and access profile
  - Terminal services
    - Note.
    - Examples include remote administration and application configuration and sharing
  - Network adaptors and drivers
- g) Implementing, monitoring, managing and troubleshooting security encompassing:
  - Data encryption using Encrypting File System
  - Local and systems security policy
  - Accounts
    - Note.
    - Examples include audits, creating accounts and account policy
  - Security Configuration Tool Set

#### 2.4.30 Network infrastructure

Evidence shall show an understanding of network infrastructure to an extent indicated by the following aspects:

- a) Domain Name Service (DNS) encompassing:
  - DNS Server Service
  - Root name server
  - Configuring zones
    - Note.
    - Examples include configuring for dynamic updates and delegating zone for DNS
  - Caching – only server
  - DNS client

- Testing DNS Server service
- Manually creating DNS source
- Managing and monitoring DNS
- b) Dynamic Host Configuration Protocol (DHCP)
  - Installation of DHCP Server Service
  - DHCP scopes, superscopes and multicast scopes
  - DHCP – DNS integration
  - Active Directory™
  - Managing and monitoring DHCP
- c) Network Infrastructure encompassing:
  - Configuring and troubleshooting remote access
    - Note.
    - Examples include remote access policy, configuration of remote access profile, Virtual Private Network (VPN), multi link connection, routing and remote access for DHCP
  - Managing and monitoring remote access
  - Remote access security
    - Note.
    - Examples include authentication protocols, encryption protocols and access policy
- d) Network Protocols encompassing:
  - Installation, configuration and troubleshooting of network protocols
    - Note.
    - Examples include Transmission Control Protocol / Internet Protocol (TCP/IP), NWLink and network bindings
  - Configure TCP/IP packets
  - Configuring and troubleshooting network protocol security and IP Security (IPSec)
  - Managing and monitoring network traffic
- e) Internet Naming Services in a network encompassing:
  - Installation, configuring and troubleshooting
  - Configuring Internet Naming Services replication
  - Configuring an application networking interface
  - Managing and monitoring Internet Naming Services
- f) IP Routing encompassing:
  - Installation, configuring and troubleshooting of IP routing protocols
    - Note.
    - This includes updating routing tables, and implementing demand-dial routing
  - Managing and monitoring IP routing
    - Note.
    - This includes border routing, internal routing and IP routing protocols
- g) Network Address Translation (NAT) encompassing:
  - Installing Internet connection sharing
  - Installing NAT
  - Configure NAT properties and interfaces
- h) Certificate Services encompassing:
  - Installing and configuring Certificate Authority
  - Issuing and revoking certificates
  - Removing the Encrypted File System recovery keys

### 2.4.31 Directory services

Evidence shall show an understanding of directory services to an extent indicated by the following aspects:

- a) Installing and configuring directory services encompassing:
  - Installing forests, trees and domains including automatic domain controller
  - Creating sites, subnets, site links and connection objects
  - Configuring server objects including site membership and global catalogue designation
  - Transferring of operations master roles
  - Verification and troubleshooting of directory services installation
  - Implementation of and organisational unit structure
- b) Domain Name Service (DNS) for directory services encompassing:
  - Installation and configuration of DNS for directory services
    - Note.
    - Examples are integration with existing DNS infrastructure, configuration of zones for dynamic and secure dynamic updates and creation and configuration of DNS records
  - Management, monitoring and troubleshooting of DNS
- c) Change and Configuration Management encompassing:
  - Implementing and troubleshooting Group Policy
    - Note.
    - Examples are Group Policy Object (GPO), linking to an existing GPO, delegation of administrative control of Group Policy, filtering of Group Policy settings by using security groups and modification of Group Policy prioritisation
  - Managing and troubleshooting user environments using Group Policy
  - Configuring directory services to support Remote Installation Services (RIS) including configuration of RIS options and security.
- d) Components of a directory service infrastructure encompassing:
  - Management of directory objects
    - Note.
    - Examples are moving objects, publishing resources in the directory service infrastructure, location of objects in the directory service infrastructure, creation and management of objects manually and by scripting, access control of objects and delegation of administrative control
  - Monitoring, optimisation and troubleshooting of the directory services infrastructure performance and replication
  - Backup and restoring directory services infrastructure
    - Note.
    - Examples are authoritative and non authoritative restoration of directory services, restoration from systems failure and the seizing of operations master roles
- e) Security encompassing:
  - Applying security policies using Group Policy
  - Creating, analysing and security modification by using Security Configuration and Analysis snap-in and the Security Templates snap-in
  - Implementation of an audit policy
- f) Monitoring and analysing security events

### 2.4.32 Operating systems and networks fundamentals

Evidence shall show an understanding of fundamentals of operating systems and networks to an extent indicated by the following aspects:

- a) Operating system fundamentals encompassing:
  - Operating systems basics

- Operating systems in current use
- Network operating systems
- b) Networking fundamentals encompassing:
  - Benefits of networking
  - Types of networks
  - Networking standards and protocols
  - Local Area Network (LAN) architecture
- c) Physical components of a network encompassing:
  - Network Interface Cards
  - Topologies
  - Physical media types
  - Network devices
  - Wide Area Networks (WANs)
- d) Transmission Control Protocol / Internet Protocol (TCP / IP) encompassing:
  - TCP/IP fundamentals
  - IP Addressing
  - Name resolution
  - TCP/IP Protocols
- e) Network Services encompassing:
  - Network services fundamentals
  - Remote administration and access services
  - Directory services
  - Other network services
- f) Network Operating Systems encompassing:
  - Systems fundamentals
  - Types of network operating systems in current use
  - Software requirements
- g) Installation and boot processes encompassing:
  - Preparation for installation
  - Installing operating system
  - Booting operating system
  - Troubleshooting installation

### 2.4.33 Operating systems and networks

Evidence shall show an understanding of operating systems and networks to an extent indicated by the following aspects:

- a) Operating systems encompassing:
  - Operating systems installation and configuration
  - Administration and user interface
  - User accounts and group accounts
  - Managing the file system
  - Services and services management
  - Servers
  - Post – installation configuration and tasks
  - Daemons

- Network operating systems
  - Note.
  - Examples of operating systems are current iteration of Windows, OS/2, Unix variants such as Linux and Mac OS X and the like.
- b) Networking Operating Systems Administration encompassing:
  - Backups
  - Drive mapping
  - Partition and process management
  - Server Resources
  - Network performance monitoring and optimisation
- c) Installing and maintaining hardware encompassing:
  - Hardware terms, concepts and components
  - Hardware installation, configuration, and maintenance
  - Checking hardware configuration
  - Diagnosing and troubleshooting devices
  - Laptop and mobile devices
- d) Troubleshooting operating systems encompassing:
  - Identifying and locating symptoms and problems
  - Boot errors
  - Error recognition
  - Troubleshooting network problems
  - Disaster recovery
- e) Network Security encompassing:
  - Developing a network security policy
  - Threats to network security
  - Implementing security measures
  - Network operating system patches
  - Firewalls

#### 2.4.34 Routing methods and protocols

Evidence shall show an understanding of routing methods and protocols to an extent indicated by the following aspects:

- a) The Routing Process
  - Routing table establishment
  - Routing advertisement methods
- b) Scalable Internet Protocol (IP) addresses encompassing:
  - Scaling with IPv4
  - Variable Length subnet Mask (VLSM) and supernetting
  - IPv6
  - Network Address Translation (NAT) and Port Address Translation (PAT)
- c) Routing protocols in current use.
  - Note.
  - 1. Examples include Routing Information Protocol (RIPv2), Enhanced Interior Gateway Protocol (EIGRP), Open Shortest Path First (OSPF) covering single, multi and NBMA areas and Virtual links, OD Rights Language (ODRL), Border Gateway Protocols (BGP) covering applications, communities, peer groups and route reflectors.
  - 2. Other relevant routing protocols may be included.
- d) Multi-protocol routing encompassing:

- o Static and floating static routes
- o Route optimisation
- o Route redistribution
- o Route filtering

e) Default route

#### **2.4.35 Networks, remote access**

Evidence shall show an understanding of remote access to networks to an extent indicated by the following aspects:

- a) Network devices and feature sets used for remote access networks encompassing:
  - o Typical Wide Area Networks (WAN) service.
  - o Devices for interfacing to WAN services
  - o Features of WAN services
  - o Required network device feature sets for effective WAN connectivity
- b) Asynchronous On-Demand WAN services encompassing:
  - o Asynchronous vs synchronous services.
  - o Configuring asynchronous Connections with modems
  - o Interfacing hosts and modems
  - o Configuring Point-to-point Protocols (PPP) and related network access with Password Authentication Protocols (PAP) and Challenge Hand Shake Authentication Protocols (CHAP)
- c) Synchronous and leased WAN connectivity encompassing:
  - o Current industry-standard WAN services
    - Note.
    - Examples include X.25, ISDN and Frame Relay
  - o Configuring remote connections
  - o Configuring dial-on-demand routing.
  - o Traffic Flow
  - o Configuring backup links
  - o Managing network performance with queuing and compression
- d) Scaling remote access networks with Network Address Translation (NAT) and Port Address Translation (PAT)
- e) Controlling corporate network access
  - o Router-based access control (like access-control lists, reflexive access control, context-bases access control)
  - o Configuring access, authentication and accounting control systems using current current industry standard tools.
    - Note.
    - Example of current industry standard tools is Remote Authentication Dial-In User Service (RADIUS)
- f) Troubleshooting the remote access network.

#### **2.4.36 Multi-layer switched networks**

Evidence shall show an understanding of multi-layer switched networks to an extent indicated by the following aspects:

- a) Campus network design encompassing:

- core layer
  - distribution layer
  - access layer
  - selection of appropriate devices
  - defining workgroups
- b) Managing Redundant Links encompassing:
- Spanning Tree Protocol (STP)
  - Controlling STP in redundant environments
  - STP in Virtual Local Area Network (VLAN) environments
  - Configuring redundant routing protocols for a fault-tolerant routing
- Note.  
An example is Hot Standby routing protocol (HSRP)
- c) Fast layer 2 services encompassing:
- Fast Ethernet
  - Trunking
  - Fast Ether channels
  - Gigabit services
- d) Inter VLAN Routing encompassing:
- Hardware vs Software switching
  - Overview of fast switching technologies
  - Elements of a multi-layer switch
  - Configuring multi-layer switches
- e) Multicast encompassing:
- Multi-cast group management
  - Configuring multi-cast control at layer 2
  - Configuring multi-cast control at layer 3
- f) Controlling Access to the Campus Network
- g) Managing Network Traffic

### **2.4.37 Fundamentals of network security**

Evidence shall show an understanding of fundamentals of network security to an extent indicated by the following aspects:

- a) Network Security fundamentals
- b) Securing the Perimeter Router
- c) Access Control Lists (ACLs)
- d) Router Authentication, Authorisation and Accounting (AAA) Security
- e) Intrusion Detection
- f) Internet Protocol (IP) Security
- g) Easy Virtual Private Network (VPN)
- h) Private Internet Exchange (PIX) Firewall
- i) Translations and Connections
- j) Access Control Lists for the PIX Firewall
- k) AAA on PIX Firewalls
- l) PIX Intrusion
- m) Intrusion Detection System (IDS)
- n) PIX Failover and System Maintenance

- o) PIX VPN
- p) PIX Device Manager

#### **2.4.38 Fundamentals of wireless security**

Evidence shall show an understanding of fundamentals of wireless security to an extent indicated by the following aspects:

- a) Standards and Network Interface Cards (NICs)
- b) Wireless radio technology
- c) Wireless topologies
- d) Access points
- e) Bridges
- f) Antennas
- g) Security
- h) Application design and site survey preparation
- i) Troubleshooting, management, monitoring and diagnostics
- j) Emerging technologies

#### **2.4.39 Internet, network basics**

Evidence shall show an understanding of network basics to an extent indicated by the following aspects:

- a) Workstation Configuration
- b) The function and interaction of workstation sub systems encompassing:
  - o Outline of network-aware operating systems
  - o Workstation network hardware
  - o Basic networking terminology
  - o IP configuration
  - o Browser configuration
  - o Digital bandwidth and data throughput
- c) The OSI Model encompassing:
  - o The OSI Reference Model
  - o Encapsulation
  - o The TCP/IP reference model
  - o TCP/IP protocols
  - o Comparison of the Open Systems Interconnection (OSI) model and the TCP/IP model
- d) Network Devices encompassing:
  - o Basic Local Area Network (LAN) Devices
    - Note.
    - Examples include repeaters, hubs, bridges, switches, routers, clouds, network segments
  - o Basics of data flow through LANs
  - o Operating system network configuration and diagnosis tools
- e) The Physical Layer encompassing:
  - o Most Common LAN Media (STP, UTP, Coax, Optical fibre)
  - o Wireless communication
  - o Cable Specification and Termination

- TIA/EIA standards
- Testing Cables
- Features of an advanced cable tester
- Advanced cable tester
- Jacks and Patch panels
- OSI Layer 1 components and devices:
  - Transceivers
  - Repeaters
  - Multi-port repeaters (hubs)
- Collisions and Collision Domains in Shared Layer Environments
- Basic Topologies Used in Networking
  - Note.
  - Examples include Linear bus, Ring, Dual ring, Star, Extended star, Tree, Irregular, Complete (mesh) and Cellular network topologies
- f) The Data Link Layer encompassing:
  - Comparing OSI Layer 1 and 2 with various LAN standards
  - Comparing the IEEE model with the OSI model
  - Logical Link Control (LLC)
  - Media Access Control (MAC) sub-layers
  - Converting between decimal and hexadecimal numbers
  - MAC Addressing
  - Framing
  - Media Access Control (MAC) and various implementations
- g) Layer 2 Trouble Shooting encompassing:
  - Basics of Token Ring
  - Basics of Fibre Distributed Data Interface (FDDI)
  - Ethernet and IEEE 802.3
  - Layer 2 Devices (NICs, Bridges, Switches)
  - Effects of Layer 2 Devices on Data Flow
  - Basic Ethernet Troubleshooting
  - Network discovery tools and their use
- h) IP Design encompassing:
  - Autonomous systems
  - Path Determination
  - Comparing flat and hierarchical addressing
  - IP Address Classes
  - Reserved Address Space
  - Basics of Sub-netting and Creating Subnets:
    - Determining subnet mask size
    - Computing hosts per sub-network
  - IP configuration on a network diagram
  - Host/subnet schemes
  - Private addresses
- i) The Network Layer encompassing:
  - Router interfaces/ports
  - DHCP initialisation sequence
  - Function of the address resolution protocol (ARP) within a subnet

- Indirect Routing
  - Proxy ARP
  - Viewing and interpreting ARP tables
  - Routable and non-Routable Protocols
  - Overview of Routing Protocols (e.g. RIP, IGRP, EIGRP, OSPF)
  - Routing encapsulation sequence
  - Multi-protocol routing
  - Connectionless and Connection-oriented network services
  - IP and transport layer
  - Static routing and dynamic routing
  - Protocol Analyser Software
- j) The Transport Layer encompassing:
- Purpose of the transport layer
  - Comparing TCP and IP
  - TCP and UDP
  - TCP segment format
  - UDP segment format
  - TCP Connection Methods
  - Examining and interpreting layer 4 traffic using an analyser
- k) The Session Layer encompassing:
- Session layer overview
  - Dialogue control
  - Dialogue separation
  - Layer 5 protocols
- l) The Presentation Layer encompassing:
- Presentation layer functions and standards
  - File formats
  - Data encryption and compression
- m) The Application Layer encompassing:
- Application processes
  - Direct and indirect network applications
  - Making and breaking a connection
  - Domain Name System
  - Network Applications Services

#### **2.4.40 Internet, network routing**

Evidence shall show an understanding of network routing to an extent indicated by the following aspects:

- a) Subnetting encompassing:
- The purpose of IP address
  - The role of host address on a routed network
  - The role of broadcast addresses on a routed network
  - Calculating sub-net addresses
  - Calculating host addresses on a sub-netted network
  - Calculating the sub-net mask

- Reserved addresses and reserved sub-nets
- b) Layer 3 and 4 Protocols encompassing:
  - Compare the Internet TCP/IP protocols and the OSI model
  - TCP and UDP operation and segment format
  - TCP and UDP port numbers
  - The Internet Layer and IP datagrams
- c) Routing encompassing:
  - Path determination
  - Routed versus routing protocol
  - Network-layer protocol operations
  - Multi-protocol routing
  - Static and dynamic routes
  - Applications of static routing
  - Default routes
  - Dynamic routing operations
  - Network metrics
  - Time to convergence
  - Distance-Vector Routing
  - Routing loops, their cause and control
  - Link-State Routing
  - Unsynchronised link-state advertisements (LSAs) problems
  - Hybrid routing protocols
  - LAN-to-LAN routing
  - LAN-to-WAN routing
  - Path selection and switching of multiple protocols and media
- d) Basic Router Configuration encompassing:
  - WAN standards, devices and technologies
  - Router functions
  - Router user interface
  - Router access modes
  - Help functions
  - Editing functions
  - Router programming modes
  - Basic router interface configuration
  - Basic routing configuration
  - Basic router diagnostic commands
- e) Neighbour Discovery Techniques encompassing:
  - Examining router status using diagnostic commands (e.g. show and debug commands)
  - Using and interpreting a router's neighbour discovery features (e.g. CDP neighbour commands)
  - Basic networking testing using ping and trace route commands
  - Checking real-time traffic with debug
  - Operating telnet sessions to explore other routers
  - Setting router names to enable the identification of routers when telneting
  - Setting passwords and names to provide access for telnet sessions
- f) Router Security encompassing:

- Router entry points
- Basic line and user security features of a router
- Setting up the router web interface
- Browsing to a router
- g) Router Boot Sequence encompassing:
  - Functional components of a router
  - Internal router's configuration components
  - External router configuration sources
  - Router booting modes
  - Configuration and systems files
  - Router boot sequence
  - Varying boot sequence through the configuration register
  - Varying the boot sequence through software commands (e.g. boot system commands)
  - Basic features of a deployment tool like ConfigMaker
  - Configuration practice
  - Web server set up
- h) IOS Management encompassing:
  - Locating the Cisco IOS software
  - Configuration register values
  - Commands for revealing system file status and requirements
  - Bootstrap Options in Software
  - TFTP server set up and operation
  - Procedures for TFTP transfer of router IOS
  - Back up and recover router IOS
  - Sources and versions of router IOS from vendor
  - Up date a router IOS
  - Vendor IOS installation tools
- i) Password Recovery encompassing:
  - Modifying the boot sequence to gain entry to a protected router (egg 1600 series and 2500 series)
  - Re-configuring the router after entry with and without loss of previous configuration
- j) DNS Configuration encompassing:
  - The Role of DNS in Router Configurations
  - Setting up DNS on a router
  - Verifying DNS operation
- k) Troubleshooting encompassing:
  - Typical layer 1 errors
  - Typical layer 2 errors
  - Typical layer 3 errors
  - Network troubleshooting strategies

#### **2.4.41 Internet, local area networking**

Evidence shall show an understanding of local area networking to an extent indicated by the following aspects:

- a) Basic Switch Configuration encompassing:
  - Factors that impact on network performance
  - Network segmentation using repeaters
  - Full-Duplex, Fast Ethernet Standard and LAN Segmentation
  - LAN segmentation with bridges
  - Pros and cons of LAN segmentation with switches
  - Microsegmentation
  - How a switch learns addresses
  - Benefits of LAN switching
  - Symmetric and asymmetric switching
  - Cut-through, fast-forward and store-and-forward switching
  - An overview of the Spanning-Tree Protocol
- b) Basic VLAN Configuration encompassing:
  - Differences between traditional switched LAN and VLANs
  - Benefits of VLANs
  - The transport of VLANs across backbones
  - The role of routers in VLANs
  - Port-centric VLANs
  - Static VLANs
  - Dynamic VLANs
  - Configuring VLANs
  - Telnetting and browsing to switches
  - Updating IOS on a switch
  - Configuring VLAN trunking
- c) VLAN Design encompassing:
  - VLAN Design Goals and Components
  - Critical components of LAN Design
  - Network Design Methodology
  - Layer 1 Design
  - Layer 2 Design
  - Layer 3 Design
  - Network documentation
  - Network documentation tools
- d) IGRP Configuration encompassing:
  - The operation of routing tables
  - The role of metrics
  - Multi-protocol routing
  - Static and dynamic routing
  - Classifications of routing protocols
  - Interior, system, and exterior routes
  - Routing configuration commands
  - Metric adjustment
  - Route prediction
  - Routing table display and interpretation
- e) Access Lists encompassing:
  - Reasons to create ACLs

- Flowchart of the ACL test matching process
  - Standard ACLs
  - Extended ACLs
  - Named ACLs
  - Using ACLs with protocols
  - Adding and removing ACLs
  - Modifying ACLs
  - Applying ACLs
  - Verifying ACLs
- f) Internet Packet eXchange protocol (IPX) encompassing:
- Protocols suite features and addresses
  - Novell Encapsulation
  - The IOS encapsulation names for Ethernet, FDDI, and Token Ring
  - Novell Routing
  - Service advertising protocol
  - Get nearest server protocol
  - Novell IPX Configuration
  - Monitoring and Managing an IPX Network
  - Using the IPX ping command
- g) Network Documentation encompassing:
- Elements of Network Documentation
  - Cut sheet diagrams
  - MDF and IDF layouts
  - Server and workstation configuration details
  - Software listings
  - Maintenance records
  - Security measures
  - User policies
  - Software tools for documentation
- h) Network Security encompassing:
- Network security issues
  - Network access
  - Data recovery
  - Back up operations
  - Redundancy techniques
- i) Network Risk Management encompassing:
- Environmental hazards (Static, Dust and Dirt, Heat )
  - Power conditioning
  - EMI and RFI
  - Software Viruses
- Note.  
Types include Worms Viruses and Trojan Horses
- j) Network Performance Assessment encompassing:
- Network baseline, updates and change verification
- k) Network Structures encompassing:
- Peer-to-Peer
  - Client-Server

- Network control
- 1) Design Report Presentation encompassing:
  - LAN design examples
  - Examining specifications (a WAN and a set of LANs; one LAN per group)
  - Designing a LAN IP scheme
  - Designing a WAN IP scheme

#### 2.4.42 Internet, wide area networking

Evidence shall show an understanding of wide area networking to an extent indicated by the following aspects:

- a) Wide Area Networks (WANs) encompassing:
  - WAN services
  - WAN terminology
  - Virtual circuits
  - WAN Devices  
(Routers, WAN switches, CSU/DSU, TAs, TNs, etc)
  - WAN and the OSI Model
  - WAN Encapsulation Formats
  - WAN Link Options
- b) WAN Design encompassing:
  - WAN design requirements
  - LAN/WAN integration issues
  - The First Steps in WAN Design
  - The three hierarchical WAN design layers
  - One-layer network designs
  - Two-layer network designs
  - The benefits of hierarchical WAN designs
  - Server placement in WANs
  - Alternatives to dedicated WAN links
- c) Serial Line protocols encompassing:
  - Point-to-Point Protocols (PPP) components, layer functions and session establishment
  - PPP Authentication
    - Note.
    - Authentication includes Password Authentication Protocols (PAP) and Challenge Hand Shake Authentication Protocols (CHAP) (PAP and CHAP)
  - Steps to configure PPP authentication
  - Steps to configure CHAP authentication
- d) Integrated Services Digital Network (ISDN) encompassing:
  - Basic ISDN components
  - ISDN reference points
  - ISDN switches and SPIDs
  - E, I, and Q ISDN protocols
  - ISDN and the OSI Reference Model
  - ISDN encapsulation
  - ISDN Uses

- BRI and PRI
  - ISDN Configuration Tasks
  - Confirming BRI operations
  - Dial-on-Demand Routing
  - DDR considerations
  - Configuring DDR
  - Verifying DDR operation
  - Troubleshooting DDR operation
- e) Frame Relay encompassing:
- Frame Relay Technology
    - Note.  
This includes Local access rate, DLCI, LMI, CIR, committed burst, excess burst, FECN, BECN, and DE)
  - Frame relay operation
  - Frame relay frame format
  - LMI Features
  - Frame relay mapping
  - Frame relay switching tables
  - Frame Relay Sub interfaces
  - Split horizon routing environments
  - Resolution of point-to-point and multipoint reachability issues
  - Configuration of Basic Frame Relay
  - Verifying frame relay operation
  - Configuring frame relay sub interfaces
- f) Network Management encompassing:
- The Administrative Side of Network Management:
    - What does a network look like?
    - Understanding and establishing the boundaries of the network
    - Costs of a network
    - Error report documentation
  - Monitoring the Network:
    - Reasons monitor a network
    - Connection monitoring
    - Traffic monitoring
  - Simple network management protocol
  - Remote monitoring (RMON)
  - Networks troubleshooting software tools

#### **2.4.43.1 Object orientated programming basics**

Evidence shall show an understanding of object orientated programming basics to an extent indicated by the following aspects:

- a) Object-Oriented programming language elements encompassing:
- Overview of (OO) programming concepts
  - Documentation
  - OO programming language elements
  - Data storage and data types

- Syntax
- b) Object-Oriented programming language operators and control structure

#### 2.4.43.2 Object orientated programming

Evidence shall show an understanding of object orientated programming to an extent indicated by the following aspects:

- a) OO programming language elements encompassing:
  - Overview of (OO) programming concepts
  - Documentation
  - OO programming language elements
  - Data storage and data types
  - Syntax
  - Object creation – mutability and destruction
- b) OO programming language operators and control structures encompassing:
  - Object operations
  - Numeric data and operations
  - Concepts of Casting and conversion
  - Character and String data
  - Control structures
  - Dissecting sample code
- c) Defining and using classes encompassing:
  - Class definitions
  - Creating objects
  - Encapsulation
  - Attributes
  - Constructors
  - Method types and syntax
  - The variable this
  - Data available in a method
  - Implementing encapsulation using methods
  - Overloading
  - Type lifespan – creation, mutability and destruction
- d) System, Strings, String Buffer, Math and Wrapper classes encompassing:
  - System and String class
  - String Buffer class
  - Input selection and repetition
  - Wrapper classes
  - Math class
  - Math package
  - Working with dates
- e) Classes and Inheritance encompassing:
  - Inheritance and object orientated programming
  - Support for inheritance
  - Access modifiers and inheritance
  - Overriding

- Use of this and super
  - Inheritance and constructors
  - Extending classes
  - Interfaces
  - Polymorphism and dynamic binding
- f) Arrays encompassing:
- Declaring and initialising Array objects
  - Using Arrays
  - Multidimensional arrays
- g) Packages encompassing:
- Application Programming Interface (API) packages eg Abstract Window Toolkit (AWT)
  - Packages and names in programs
  - Accessing packages
  - Packaging classes
- h) Creating Graphical User Interfaces (GUI) applications using AWT encompassing:
- Methodology for creating a GUI
  - GUI functionality
- i) Creating applets and graphics encompassing:
- Creating and applet
  - Applet and AWT class hierarchies
  - Applet methods and Components
  - Applets and Event-driven programming
  - Creating graphic objects
  - Graphics methods
  - Animation
- j) Exceptions encompassing:
- Exceptions concepts and handling of exceptions
  - Types of exceptions
  - Exception objects
  - Dealing with exceptions
  - Defining and using exceptions
  - Structuring a method and the execution sequence
  - Overriding exceptions
- k) Streams, files and Stream output encompassing:
- Understanding files
  - Input and output classes and operations
  - Storing objects in a file
- l) Utility Classes encompassing:
- Collections and collection framework
  - Generating Random Numbers
- m) Threads encompassing:
- Threads and Multithreading
  - The Thread class and Runnable interface
  - Thread lifecycle
  - Creating and running and managing threads

#### 2.4.44.1 Microprocessor/microcontroller assembler language programming

Evidence shall show an understanding of microprocessor assembly language to an extent indicated by the following aspects:

- a) CPU Architecture
  - registers.
  - instruction set considerations, common and advanced instructions.
  - addressing modes supported: direct, indirect, indexed etc.
  - software interrupts and system calls.
- b) Processor And System Support
  - instruction pre-fetch pipeline.
  - system timer chip, function and programming.
  - hardware interrupt programming considerations.
  - DMA devices and support.
  - co-processors and bus interface.
- c) Modular Programming
  - separately compiled and linked assembly language modules.
  - library modules.
  - macros.
- d) Documentation And Debugging
  - system specification and documentation
  - debugging and tracing program execution

#### 2.4.44.2 High level programming

Evidence shall show an understanding of high-level language programming as it is applied to engineering applications to an extent indicated by the following aspects:

- a) Program structure and compilation encompassing:
  - Top-down modular design methodology
  - Integrated development environments
- b) Data types and operators encompassing:
  - variables, constants, simple data types
  - cast operator
  - good operating practices related to variable and constant identifiers
- c) Loop control encompassing:
  - relational, equality and logical operators
  - compound operators
  - if-else, switch
  - while, do-while, for, break and continue
  - good operating practices related to structured programming
- d) Complex data types and structures encompassing:
  - Pointers/references
  - arrays and strings
  - user-defined data types
- e) Interfacing high-level languages to assembler encompassing:

- in-line assembly.
- bit manipulation
- IO port addressing

#### **2.4.44.3 Advanced high-level programming**

Evidence shall show an understanding of advanced high-level language programming as it is applied to engineering applications to an extent indicated by the following aspects:

- a) Object Orientated Programming concepts
  - Encapsulation
  - Inheritance
  - Polymorphism
- b) Creating applications with a Graphical Interface
- c) Using external libraries

#### **2.4.45 Copier/printer software functions and configuration**

Evidence shall show an understanding of copier/printer software to an extent indicated by the following aspects:

- a) Copier/printer software functions and configuration options
- b) Device driver software installation and configuration
- c) Available user function
- d) Diagnostic software functions and their use:

#### **2.4.46 Security systems basic software functions and configuration**

Evidence shall show an understanding of security systems basic software to an extent indicated by the following aspects:

- a) Security system software functions and configuration options
- b) Access and detection functions
- c) Diagnostic functions and their use

#### **2.4.47 Security systems programming methods**

Evidence shall show an understanding of security systems programming methods to an extent indicated by the following aspects:

- a) Vender programming codes and functions encompassing:
  - Input/output instruction
  - Variable
  - Timers
  - Limitations of vender software
- b) Program loading methods using a personal computer
- c) Program testing methods

#### **2.4.48 Security systems alarms programming**

Evidence shall show an understanding of security systems alarms programming to an extent indicated by the following aspects:

- a) Vender programming codes and functions encompassing:
  - Input/output instruction
  - Variable
  - Timers
  - Limitations of vender software
- b) Program loading methods using a personal computer
- c) Program testing methods

#### **2.4.49.1 Security systems access control programming**

Evidence shall show an understanding of security systems access control programming to an extent indicated by the following aspects:

- a) Vender programming codes and functions encompassing:
  - Input/output instruction
  - Variable
  - Timers
  - Limitations of vender software
- b) Program loading methods using a personal computer
- c) Program testing methods

#### **2.4.49.2 Security systems closed circuit television programming**

Evidence shall show an understanding of security systems closed circuit television programming to an extent indicated by the following aspects:

- a) Vender programming codes and functions encompassing:
  - Input/output instruction
  - Variable
  - Timers
  - Limitations of vender software
- b) Program loading methods using a personal computer
- c) Program testing methods

#### **2.4.50.1 Integrated security systems**

Evidence shall show an understanding of integrated security systems to an extent indicated by the following aspects:

- a) security scenarios
- b) security network standards and protocols
- c) network topology
- d) physical media
- e) disaster planning

#### **2.4.50.2 Internetworking security systems**

Evidence shall show an understanding of internetworking security systems to an extent indicated by the following aspects:

- a) Security scenarios
- b) security network standards and protocols
- c) network topology
- d) physical media
- e) disaster planning

#### **2.4.51 Fire protection systems programming methods**

Evidence shall show an understanding of fire protection systems programming methods to an extent indicated by the following aspects:

- a) Vender programming codes and functions encompassing:
  - Input/output instruction
  - Variable
  - Timers
  - Limitations of vender software
- b) Program loading methods using a personal computer
- c) Program testing methods
- d) Program back up, version control and documentation requirements

## 2.5 Drawings, diagrams, schedules, manuals, standards and regulations

### 2.5.1.1 Drawings interpretation and sketching

Evidence shall show an understanding of drawings interpretation and sketching to an extent indicated by the following aspects:

- a) Basic technical drawing conventions and symbols
- b) Freehand technical sketching techniques

### 2.5.1.2 Drawings and diagrams

Evidence shall show an understanding of drawings, diagrams and schedules used in electrotechnology work to an extent indicated by the following aspects:

- a) Drawing types and applications encompassing:
  - Drawing layouts and conventions
 

Note:  
Examples include mechanical drawings, electrical/electronic schematics, wiring diagrams, PC boards, location diagrams (architectural drawings), cable routes and switching arrangements and building details.
  - Drawing symbols
 

Note:  
Examples include symbols representing electrotechnology circuit components, equipment location and cable routes and control arrangements.
- b) Cable/wiring/connection and equipment/component/schedules.

### 2.5.2.1 Technical standards, regulations and codes for general electrical installations

Evidence shall show an understanding of technical standards and regulations that apply to electrical installations to an extent indicated by the following aspects:

- a) Regulation for undertaking electrical work
- b) Standards philosophy and format
  - How to read and apply a standard.
  - Standards and Codes that apply to all types of electrical installations

Note:

  1. Standards include Standards mandated under regulation or by an authority, deemed-to-comply standard and local service requirements.
  2. Codes include those applicable to electrical safe working practices.
- c) Applying standards, regulations and codes to general electrical installation encompassing:
  - Protection for safety
  - Installation design
  - Selection of electrical equipment
  - Installation of electrical equipment
- d) Testing and verification

### 2.5.2.2 Technical standards, regulations and codes for special electrical installations

Evidence shall show an understanding of technical standards and regulations that apply to

special electrical installations to an extent indicated by the following aspects:

- a) Additional requirements for special installations
- b) Applying standards, regulations and codes to special electrical installation

Note:

Special installations are those in caravan parks, construction and demolition sites, marinas, medical treatment areas and moveable premises and HV installation in consumer's premises

### **2.5.2.3 Technical standards, regulations and codes for testing and tagging portable and cord connected electrical apparatus**

Evidence shall show an understanding of technical standards and regulations that apply to testing and tagging portable and cord connected electrical apparatus to an extent indicated by the following aspects:

- a) Regulation for undertaking testing and tagging work
- b) Standards and Codes that apply to testing and tagging
  - How to read and apply a standard
  - Standards and Codes that apply to testing and tagging

Note:

1. Standards include Standards mandated under regulation or by an authority, deemed-to-comply standard and local service requirement
2. Codes include those applicable to electrical safe working practices

- c) Applying standards, regulations and codes to testing and tagging encompassing:
  - Apparatus and cord inspection and testing
  - Tests and testing methods
  - Test results and compliance requirements
- d) Tagging system methods and requirements.

### **2.5.3 Technical standards, regulations and codes for lifts and escalators**

Evidence shall show an understanding of technical standards and regulations that apply to lifts and escalators to an extent indicated by the following aspects:

- a) Standards philosophy and format
- b) How to read and apply a standard
- c) Standards and Codes that apply to lifts and escalators
- d) Applying standards, regulations and codes

### **2.5.4 Technical standards, regulations and codes rail networks**

Evidence shall show an understanding of technical standards and regulations that apply to rail networks and escalators to an extent indicated by the following aspects:

- a) Standards philosophy and format
- b) How to read and apply a standard
- c) Standards and Codes that apply to rail networks
- d) Regulations

### **2.5.5 Technical standards, regulations and codes for extra low voltage work**

Evidence shall show an understanding of technical standards, regulations and codes related

to extra-low voltage work to an extent indicated by the following aspects:

- a) Limitation imposed by regulations
- b) How to read and apply a standard
- c) Aspects of technical Standards that apply to extra-low voltage work

### **2.5.6 Technical standards, regulations and codes for refrigeration and air conditioning**

Evidence shall show an understanding of technical standards and regulations that apply to refrigeration and air conditioning to an extent indicated by the following aspects:

- a) Standards philosophy and format
- b) How to read and apply a standard
- c) Standards and Codes that apply to refrigeration and air conditioning
- d) Regulations
- e) Equipment manufactures specifications

### **2.5.7 Technical standards, regulations and codes for telecommunications cabling**

Evidence shall show an understanding of technical standards and regulations that apply to telecommunications cabling to an extent indicated by the following aspects:

- a) Role of Australian Communications Authority (ACA) under the Telecommunication Act 1997
- b) Penalties for non compliance
- c) Standards and Codes that apply to telecommunications cabling encompassing:
  - Current technical standards applicable to cabling
  - Aspects of other technical standards or codes of practice called up by regulation
  - Cabling Provider Rules' requirements
  - Certified components
- d) Application of Standards, Codes and regulations encompassing:
  - Cabling installation, protection and segregation
  - Earthing and protection
  - Cable connections
  - Certification
  - Labelling and documentation of cabling and active communication equipment
- e) Cabler Registration requirements and processes

### **2.5.8 Technical standards, regulations and codes for electronic apparatus**

Evidence shall show an understanding of electronic apparatus to an extent indicated by the following aspects:

- a) Standards philosophy and format
- b) How to read and apply a standard
- c) Standards and Codes that apply to electronic apparatus
- d) Applying standards, regulations and codes

### **2.5.9 Building codes applicable to general electrotechnology installations**

Evidence shall show an understanding of building codes to an extent indicated by the following aspects:

- a) Building code philosophy and format
- b) How to read and apply a code
- c) Codes that apply to general electrotechnology installations
- d) Applying codes

### **2.5.10 Technical manuals and catalogues**

Evidence shall show an understanding of the use of technical manuals and catalogues for electrotechnology work to an extent indicated by the following aspects:

- a) Typical format
- b) How to read and apply information

### **2.5.11 Environmental and heritage awareness**

Evidence shall show an understanding of environmental and heritage regulation effecting electrotechnology work to an extent indicated by the following aspects:

- a) Purpose of environmental and heritage regulation
- b) Typical issues affecting electrotechnology services and systems
- c) Meeting requirements

### **2.5.12 Electricity distributors, supply requirements**

Evidence shall show an understanding of supply arrangements of electricity distributors to an extent indicated by the following aspects:

- a) General requirements for the supply of electricity.
- b) Supply and metering requirements.
- c) Acceptable arrangement of switchgear and controlgear.
- d) Acceptable earthing methods and arrangements

### **2.5.13 Electricity regulatory safety requirements**

Evidence shall show an understanding of safety requirement of electricity regulator to an extent indicated by the following aspects:

- a) Regulatory requirements for ensuring the safety and integrity of electrical installations.

Note:

Regulatory requirements are relative to the jurisdiction for which competency is sought

- b) Types and scope of electrical inspections and safety audits
- c) Authority of electrical inspectors

### **2.5.14 Technical standards, regulations and codes applicable to instrumentation and control**

Evidence shall show an understanding of technical standards and regulations that apply to telecommunications cabling to an extent indicated by the following aspects:

- a) Standards philosophy and format
- b) How to read and apply a standard.
- c) Standards and Codes that apply to instrumentation and control

Note:

1. Examples of standards and code are those covering hazardous materials, potentially explosive atmospheres, certification of apparatus, environment protection, safety and the like

- d) Regulations

#### **2.5.15 Measurement standards applicable to process instrumentation**

Evidence shall show an understanding of technical standards and regulations that apply to telecommunications cabling to an extent indicated by the following aspects:

- a) Standards philosophy and format
- b) How to read and apply a standard.
- c) Certification standards that apply to process instrumentation
- d) Process instrumentation that apply to certification

#### **2.5.16 Measurement standards applicable to scientific instruments**

Evidence shall show an understanding of technical standards and regulations that apply to telecommunications cabling to an extent indicated by the following aspects:

- a) Standards philosophy and format
- b) How to read and apply a standard.
- c) Certificate standards that apply to scientific instrumentation
- d) Scientific instrumentation certification process

#### **2.5.17 Regulatory requirements for the generation, transmission and distribution of electricity**

Evidence shall show an understanding of regulations that apply to the generation, transmission and distribution of electricity to an extent indicated by the following aspects:

- a) Generation, transmission and distribution technical standards
- b) Scope of regulatory requirements

#### **2.5.18 Regulatory requirements and codes of practice for the gaming equipment**

Evidence shall show an understanding of regulations that apply to gaming equipment to an extent indicated by the following aspects:

- a) Types of equipment permitted —
  - Location restrictions and requirements
  - Operational restrictions and requirements
- b) Security encompassing:
  - Access to customers premises
  - Access to machines

### **2.5.19 Technical standards, regulations and codes for mining**

Evidence shall show an understanding of technical standards and regulations that apply to mines to an extent indicated by the following aspects:

- a) Regulation governing mining and related activities
- b) Standards and Codes that apply to mining electrical systems

Note:

- 1. Standards include Standards mandated under regulation or by an authority, deemed-to-comply standard and local service requirements.
- 2. Codes include those applicable to electrical safe working practices

- c) Applying standards, regulations and codes to mining electrical systems encompassing:

- Protection for safety
- Installation arrangement
- Certified/approved electrical equipment
- Installation of electrical equipment
- Testing and verification

### **2.5.20 Technical standards, regulations and codes for security systems**

Evidence shall show an understanding of technical standards and regulations that apply to security systems to an extent indicated by the following aspects:

- a) Regulation governing security system installations
- b) Standards and Codes that apply to security systems and equipment

Note:

- 1. Standards include Standards mandated under regulation or by an authority, deemed-to-comply standard and local service requirements.
- 2. Codes include those applicable to electrical safe working practices

- c) Applying standards, regulations and codes to security systems encompassing:

- Installation arrangement
- Certified/approved security equipment
- Installation of security equipment
- Testing and verification

### **2.5.21 Technical standards, regulations and codes for fire protection and warning systems**

Evidence shall show an understanding of technical standards and regulations that apply to fire protection and warning systems to an extent indicated by the following aspects:

- a) Regulation governing fire protection and warning system installations
- b) Standards and Codes that apply to fire protection systems and equipment

Note:

- 1. Standards include Standards mandated under regulation or by an authority, deemed-to-comply standard and local service requirements.
- 2. Codes include those applicable to electrical safe working practices

- c) Applying standards, regulations and codes to fire protection systems encompassing:

- Installation arrangement
- Certified/approved fire equipment
- Installation of fire equipment
- Testing and verification
- Final commissioning verifications

**2.5.22 Performance standards and regulatory requirements for the electrical rotating machine**

Evidence shall show an understanding of performance standards and regulations that apply to electric motors and generators to an extent indicated by the following aspects:

- a) Standards philosophy and format
- b) How to read and apply a standard
- c) Performance standards encompassing:
  - Safety requirements
  - Machine efficiency
- d) Regulations

**2.5.23 Performance standards and regulatory requirements for electrical equipment**

Evidence shall show an understanding of performance standards and regulations that apply to electrical equipment to an extent indicated by the following aspects:

- a) Standards philosophy and format
- b) How to read and apply a standard
- c) Performance standards encompassing:
  - Safety requirements
  - Machine efficiency
- d) Regulations

## 2.6 Electrical applications and apparatus

### 2.6.1 Protection devices and applications

Evidence shall show an understanding of protection devices and their application to an extent indicated by the following aspects:

- a) Purpose, types and applications.

Note:

Types include rewirable fuses, HRC fuses, circuit breakers, residual current devices and overvoltage and undervoltage protection.

- b) Operating principles and characteristics

Note.

Principles include the purpose of earthing and the MEN system.

- c) Requirements for coordination and discrimination of circuit protection devices.

### 2.6.2.1 Switchboards / distribution boards

Evidence shall show an understanding of switchboards / distribution board to an extent indicated by the following aspects:

- a) Purpose, types and applications.
- b) Equipment installed on switchboards.
- c) Arrangements of equipment.

### 2.6.2.2 Electrical metering arrangements

Evidence shall show an understanding of electrical metering arrangements to an extent indicated by the following aspects:

- a) Purpose, types and applications.
- b) Metering equipment.
- c) Arrangements for metering.

### 2.6.2.3 Interval metering concepts and applications

Evidence shall show an understanding of interval metering to an extent indicated by the following aspects:

- a) Purpose, types and applications.
- b) Installation and power connection arrangements.
- c) Communication methods and arrangements.
- d) Connections for gas metering.
- e) Procedures for setting meter parameters.

### 2.6.3 Single phase alternators

Evidence shall show an understanding of single phase alternators to an extent indicated by the following aspects:

- a) Purpose, types and applications
- b) Operating principles and characteristics

- c) Installation and starting/running requirements and limitations
- d) Connection arrangements
- e) Typical fault symptoms and related conditions

#### **2.6.4 Three phase alternators**

Evidence shall show an understanding of three phase alternators to an extent indicated by the following aspects:

- a) Purpose, types and applications
- b) Operating principles and characteristics
- c) Installation and starting/running requirements and limitations
- d) Connection arrangements
- e) Typical fault symptoms and related conditions

#### **2.6.5 Single phase motors**

Evidence shall show an understanding of single phase motors to an extent indicated by the following aspects:

- a) Purpose, types and applications
- b) Operating principles and characteristics
- c) Installation and starting/running requirements and limitations
- d) Connection arrangements
- e) Typical fault symptoms and related conditions

##### **2.6.6.1 Three phase motors**

Evidence shall show an understanding of three phase motors to an extent indicated by the following aspects:

- a) Purpose, types and applications
- b) Operating principles and characteristics
- c) Installation and starting/running requirements and limitations
- d) Connection arrangements
- e) Typical fault symptoms and related conditions

##### **2.6.6.2 Alternating current rotating machines**

Evidence shall show an understanding of alternating current rotating machines to an extent indicated by the following aspects:

- a) Three phase motors encompassing:
  - principles of operation.
  - construction features of various induction motor types.
  - relationship between torque, speed, and power in an induction motor.
  - conditions necessary for an induction motor to produce maximum torque.
  - operating characteristics of an induction motor from name plate information and by measurement.
  - full load efficiency and power factor of induction motors.
  - minimum energy performance standards (MEPS)

b) Motor protection encompassing:

- conditions that cause motors to overheat.
- protection of motors against overcurrent and undervoltage.
- operating principles of microtherm devices, thermal and magnetic overloads and current control relays.
- HRC fuses/circuit breakers selection to protect a motor circuit.
- overload devices for a given motor and load condition.

c) Purpose of limiting starting current of machines encompassing:

- operating characteristics and applications of DOL, star-delta, auto transformer, soft start, primary resistance and secondary resistance starters.
- relative starting torque produced by a motor using each type of starter.
- components and operating sequence of each type of starter.
- conditions necessary for a motor to accelerate when coupled to a load.
- effects on motor performance when a load variation occurs.

d) Connection methods of three phase starters encompassing:

- interpretation of motor starter wiring diagrams.
- connection of motor starters with local or remote stop-start stations.

e) Wiring Rules and service rule requirements encompassing:

- Wiring Rules' requirements relating to motors, their protection and control.
- state local Supply Authorities' requirements for the limitation of starting current, connection and controls of electric motors.

f) Three phase induction motor controls encompassing:

- reversing motor direction of rotation.
- braking methods.

Note:

Braking methods to include: dynamic, plugging, regenerative, eddy current and mechanical.

- speed control methods

Note:

Speed control methods to include: voltage control, pole changing, variable voltage/variable frequency and slip control.

g) Single phase motor principles and characteristics encompassing:

- production of 'rotating' magnetic field in split-phase and shaded-pole motors.
- relative difference in torque produced by various types of 'phase-splitting' motors using a phasor diagram.
- torque/speed characteristics of single phase motors.
- circuit diagrams of split-phase, capacitor start, capacitor start-run motors, shaded-pole motor and universal motor.
- methods of reversing the direction of rotation of single-phase motors.

h) Single phase motor construction encompassing:

- identification of the run winding and the start/auxiliary winding in a split-phase motor by resistance measurement at the motor terminals.
- identification of the starting circuits switching devices and explain how they operate.
- identification of the components in single-phase motors and explain their purpose.
- identification of the devices used with single-phase motors to provide overload protection, over-temperature protection, automatic or remote starting and speed

control.

- i) Single phase motor applications encompassing:
  - power, torque and speed characteristics of various types of motors.
  - power, torque, speed and efficiency of single-phase motors.
  - typical applications for various types of single-phase motors.
- j) Fault testing encompassing:
  - common causes of motor malfunction.
  - load test on a motor to determine whether the terminal voltage is correct, line current is balanced and the motor operates within rated speed.
  - faults in various motor windings for various winding conditions.
  - tests on motors and circuits to locate faults.
- k) Three-phase synchronous machines encompassing:
  - constructional details of three-phase alternators, induction generators and synchronous motors.
  - operation of three-phase alternators, induction generators and synchronous motors.
  - applications of induction generators and three-phase synchronous motors.
  - nameplate data.
  - full load current ratings of synchronous machines.
- l) Three-phase synchronous machines encompassing:
  - effect of a given load on the output characteristics of a three-phase alternator.
  - effect of excitation variation on a given operating condition of a three-phase alternator.
  - effect of load on a three-phase synchronous motor.
  - effect of excitation variation in relation to a three-phase synchronous motor.
- m) Single phase synchronous machines encompassing:
  - constructional details of common single-phase portable alternator.
  - operating characteristics of common single-phase alternators.
  - type of common single-phase synchronous motor given constructional details.
  - appropriate application of each type of motor identified.

### **2.6.7 Single phase transformers**

Evidence shall show an understanding of single phase transformers to an extent indicated by the following aspects:

- a) Purpose, types and applications
- b) Operating principles and characteristics
- c) Installation and operating requirements and limitations
- d) Connection arrangements
- e) Typical fault symptoms and related conditions

#### **2.6.8.1 Three phase transformers**

Evidence shall show an understanding of three phase transformers to an extent indicated by the following aspects:

- a) Purpose, types and applications

- b) Operating principles and characteristics
- c) Installation and operating requirements and limitations
- d) Connection arrangements
- e) Typical fault symptoms and related conditions

### 2.6.8.2 Single & three-phase transformers

Evidence shall show an understanding of single and three phase transformers to an extent indicated by the following aspects:

- a) Transformer construction and operating principles encompassing:
  - types of lamination style and core construction used in single-phase, three-phase, double wound and auto transformers.
  - different winding styles/types used in transformers.
  - no load and load operating parameters.
  - transformation ratio.
  - nameplate data.
  - operation of a transformer under load/no load conditions.
  - application of transformers.
  - safety features specified in AS/NZS 3000:2000 with respect to transformers.
  - safety features specified in AS/NZS 3000:2000 with respect to isolating transformers.
  - basic insulation resistance, continuity and winding identification tests.
- b) Transformer parameters encompassing:
  - percentage impedance of a transformer.
  - equivalent circuit of a transformer.
  - voltage regulation.
  - losses that occur in a transformer.
  - tests to determine losses.
  - efficiency and all day efficiency of a transformer.
- c) Cooling methods encompassing:
  - methods of natural and forced cooling.
  - properties of transformer oil.
  - tests performed on transformer oil.
  - auxiliary equipment
  - purpose and operation of auxiliary equipment used on transformers

Note:  
Examples are: bushings, explosion vents, surge diverters, tap changers, conservator, breathers and desiccants, gas relays, temperature indicators.
- d) Instrument transformers encompassing:
  - construction of current transformers.
  - uses and ratings of current transformers.
  - construction of voltage transformers.
  - uses and ratings of voltage transformers.
  - safety techniques when using instrument transformers.
- e) Transformer connections encompassing:

- vector group of a transformer from a connection diagram.
  - connections of a three-phase transformer to create a particular vector group.
  - using the different vector groups.
  - tertiary windings.
  - consequences/effect of an incorrect connection.
- f) Parallel operation encompassing:
- polarity markings for the windings of a transformer.
  - conditions/restrictions for parallel operation of transformers.
  - loading on transformers operating in parallel.
  - connection of transformers in parallel to supply a common load.
  - the consequences/effect of an incorrect connection.
- g) Harmonics in transformers encompassing:
- harmonics generated in transformers.
  - problems caused by harmonics in transformers.
  - observation and measurement of the harmonics in a transformer.
  - methods/equipment used to overcome harmonics in transformers.
- h) High voltage isolation encompassing:
- the term high voltage.
  - procedures for isolating high voltage apparatus.
  - regulations with respect to *access permits*.
  - clearances to be observed with respect to high voltages up to 33kV.
  - the term ‘step’ and ‘touch’ potential.

### 2.6.8.3 Power transformers diagnostics

Evidence shall show an understanding of power transformers to an extent indicated by the following aspects:

- a) Transformer construction and operating principles encompassing:
- various types of lamination style and core construction used in single-phase, three-phase, double wound and auto transformers.
  - different winding styles/types used in transformers.
  - how input current is limited on no load and how power is transferred from primary to secondary when a load is connected.
  - using the transformation ratio to determine an unknown quantity of V, I, VA.
  - significance of nameplate data items.
  - operation of a transformer under load/no load conditions.
  - the reason any particular type of transformer is used in a specific application.
  - safety features specified in regulatory standards with respect to transformers.
  - safety features specified in regulatory standards with respect to isolating transformers.
  - basic insulation resistance, continuity and winding identification tests.
- b) Transformer parameters encompassing:
- the percentage impedance of a transformer by test.
  - percentage impedance of a transformer by calculation.

- the equivalent circuit of a transformer.
  - calculation of voltage regulation.
  - losses that occur in a transformer.
  - tests to determine losses.
  - efficiency and state typical values.
  - the all day efficiency of a transformer.
- c) Cooling methods encompassing:
- methods of natural and forced cooling.
  - properties of transformer oil.
  - tests performed on transformer oil.
  - auxiliary equipment
  - the purpose and operation of the types of auxiliary equipment used on transformers
- Note.  
Examples are bushings, explosion vents, surge diverters, tap changers, conservator, breathers and desiccants, gas relays, temperature indicators.
- d) Instrument transformers encompassing:
- construction of current transformers.
  - uses and ratings of current transformers.
  - construction of voltage transformers.
  - uses and ratings of voltage transformers.
  - safety techniques when using instrument transformers.
- e) Transformer connections encompassing:
- vector group of a transformer from a connection diagram.
  - connections of a three-phase transformer to create a particular vector group.
  - reasons for using the different vector groups.
  - purpose of tertiary windings.
  - consequences/effect of an incorrect connection.
- f) Parallel operation encompassing:
- polarity markings for the windings of a transformer.
  - conditions/restrictions for parallel operation of transformers.
  - calculation of loading on transformers operating in parallel.
  - connection of transformers in parallel to supply a common load.
  - the consequences/effect of an incorrect connection.
- g) Harmonics in transformers encompassing:
- how harmonics are generated in transformers.
  - problems caused by harmonics in transformers.
  - measurement of the harmonics in a transformer.
  - methods/equipment used to overcome harmonics in transformers.
- h) High voltage isolation encompassing:
- the term high voltage.
  - procedures for isolating high voltage apparatus.
  - regulations with respect to *access permits*.
  - clearances to be observed with respect to high voltages up to 33kV.

- the term ‘step’ and ‘touch’ potential.

### 2.6.9.1 Lighting fundamentals

Evidence shall show an understanding of luminaires - lighting fundamentals to an extent indicated by the following aspects:

#### a) Lighting concepts

- Principles of light
- Common lighting terms

Note.

Example are lumens, lux, candela, efficacy, lamp, lamp life, luminance, illuminance, luminaire and lamp colour.

- Measurement of lighting levels using light meters.

#### b) Light producing principles of incandescent, fluorescent and gas discharge lamps.

### 2.6.9.2 Luminaires and lighting systems

Evidence shall show an understanding of luminaires to an extent indicated by the following aspects:

#### a) Types and applications of luminaires

#### b) Operating principles and connection arrangements

Note:

Principles and connections include ancillary equipment and power factor improvement methods

#### c) Installation and operating requirements and limitations

#### d) Typical fault symptoms and related conditions of lighting circuits

- Common faults in fluorescent lights
- Testing techniques – dead and live testing

#### e) Supply authority requirements for lighting circuits

- Requirements for power factor correction
- Requirements to prevent interference of supply authority control signals
- Terms lead/lag, LPF, HPF/BI and stroboscopic effect.

#### f) Evacuation lighting systems

- Requirements of system (Building Codes and Standards)
- Types of systems (central battery system and self contained system)
- Luminaire types (non-maintained, maintained and sustained)
- Maintenance requirements.

### 2.6.9.3 Venue lighting for audio/video/live presentations

Evidence shall show an understanding of venue lighting to an extent indicated by the following aspects:

#### a) Lighting types and colour

#### b) Effects of direction of light

#### c) Use of natural light

#### d) Lighting levels and control

### 2.6.10 Electric heating

Evidence shall show an understanding of electric heating to an extent indicated by the following aspects:

a) Heating and heat energy encompassing:

- heat and temperature.
- methods of heat transfer.
- thermal conductivity and its dependent factors.

b) Control of heating encompassing:

- methods of heat control, manual and automatic
- function of a thermostat with respect to its mechanical operation, sensitivity and differential
- thermostat testing for correct operation within its specification
- applications of thermostats
- operation and application of a simmerstat
- electronic techniques employed for heat control

Note.

Example are zero crossing, phase control, voltage control, half/full wave

c) Heating process encompassing:

- Types of domestic and industrial water heaters and their control.
- Intrinsic safety precautions employed with water heaters.
- Solar heating as a supplement or replacement for electrical heating.
- Tariff mechanisms employed with heating processes.
- Types of space heaters and their control methods

Note.

Examples are strip heaters, storage heaters, under carpet heating, reverse cycle air conditioning and infra-red heating.

- Types of cooking appliances and their control method

Note.

Examples are resistance, induction heating and microwave.

- Industrial process heating and their control

Note.

Examples are resistance heating, infra-red ovens, induction heating, dielectric heating, electric arc.

- Causes of a fault in a malfunctioning electric heating device/circuit

Note.

Faults may include open circuits, short circuits, high resistance, low insulation resistance, thermostat or cut-out failure.

### 2.6.11 Direct current machine fundamentals

Evidence shall show an understanding of d.c. machine to an extent indicated by the following aspects:

a) Types and applications

b) Motor circuit configurations

c) Name plate details

### 2.6.12 Direct current machines

Evidence shall show an understanding of d.c. machines to an extent indicated by the following aspects:

- a) Purpose, types and applications
- b) Operating principles
- c) Installation and starting/running requirements and limitations
- d) Connection arrangements
- e) Typical fault symptoms and related conditions.

### 2.6.13 Motor starters and overload protection basics

Evidence shall show an understanding of motors starter and overload protection to an extent indicated by the following aspects:

- a) Purpose of motor starters and overload protection
- b) Starting current limitations
- c) Types and applications
- d) Basic motor starter control circuits and safety interlocks

### 2.6.14 Direct-on-line (DOL) motor starters

Evidence shall show an understanding of DOL motors starter to an extent indicated by the following aspects:

- a) Operating principles
- b) Power and control connection arrangements encompassing:
  - Built-in stop/start control
  - Remote stop/start control
  - Overload protection
  - Interlocking with other starters
- c) Overload protection characteristics

### 2.6.15 Reduced voltage a.c. motor starters

Evidence shall show an understanding of reduced voltage motors starter to an extent indicated by the following aspects:

- a) Types of starter and their operating principles

Notes:

Types include star/delta; primary resistance; secondary resistance; auto transformer and soft starters.

- b) Power and control connection arrangements encompassing:
  - Built-in stop/start control
  - Remote stop/start control
  - Overload protection
  - Interlocking with other starters and controls

### 2.6.16 Direct current motor controls

Evidence shall show an understanding of direct current motor controls to an extent

indicated by the following aspects:

a) Types of starter and their operating principles

Notes:

Types include back emf; series-lockout, timed starters and electronic controllers

b) Power and control connection arrangements encompassing:

- Built-in stop/start control
- Remote stop/start control
- Overload protection
- Interlocking with other starters and controls

c) Braking methods encompassing:

- Dynamic,
- Plugging,
- Electromechanical, and
- Regenerative.

d) Speed control methods encompassing:

- Field control
- Reostatic control
- Voltage control

e) Protection of d.c. motors

### 2.6.17 Cells and batteries

Evidence shall show an understanding of cells and batteries to an extent indicated by the following aspects:

a) Types and electricity production processes.

Notes:

1. Types include primary and secondary cells in common use.
2. Processes include discharging and recharging

b) Cell parameters.

Note:

Examples include terminal voltages, capacity and discharge and recharge characteristics.

c) Battery configurations and applications.

d) Cell and battery safety practices.

### 2.6.18 RAPS systems basics

Evidence shall show an understanding of RAPS systems. to an extent indicated by the following aspects:

a) System components and their functions.

Note:

1. System components are engine driven generator sets, photo voltaic arrays, wind driven generator sets, battery banks, system inverters and controls.
2. The function of each component includes how they operate within the system.

b) Operating parameters of each component and of the system

Note:

Operating parameters include voltage range and current supplied by each power component to the system and limitations on system components to supply various loads.

### 2.6.19 RAPS systems demand side management

Evidence shall show an understanding of RAPS systems demand side management to an extent indicated by the following aspects:

- a) Need for demand side management
- b) Demand limitations and seasonal variations in capabilities of given RAPS systems

Note:

Factors limiting demand are rating of the system and its components, demand of individual appliances, most suitable source of supply for individual appliances, population of local community and how and when appliances are used

- c) Optimisation of system performance
- d) Methods for evaluating long term changes to community and/or household power requirements

### 2.6.20 Electrical mining systems overview

Evidence shall show an understanding of electrical mining systems to an extent indicated by the following aspects:

- a) Mine reticulation encompassing:
  - Mine reticulation
  - Substations
  - Transmission lines
  - Switchgear
  - Earthing
- b) Electrical control and protection encompassing:
  - Types of protection
  - Operation of protection devices and systems
  - Prospective fault currents
  - Discrimination
- c) Mining cables encompassing:
  - Handling
  - Storage
  - Testing
- d) Ventilation fans
- e) Operation and safety of mining equipment encompassing:
  - Battery charging
  - Battery operated vehicles
  - Conveyors
  - Mine winder and package systems
  - Ore extraction machinery
  - Shuttle cars
  - Ventilation fans
- f) Environmental monitoring and control encompassing:
  - Basic principle

- Types and application of sensors
  - Control methods
- g) Equipment monitoring methods
- h) Fire detection, warning and control systems

### **2.6.21 Electricity supply and reticulation**

Evidence shall show an understanding of electricity supply and reticulation systems to an extent indicated by the following aspects:

- a) Generation
- primary energy sources
  - power stations
  - power station output
  - acts and legislation relating to generation
  - renewable energy sources and techniques
- b) Transmission
- system requirements
  - principal components of a power system
  - voltage levels
  - grid systems
  - acts/legislation relating to transmission
  - future trends
- c) Distribution
- high voltage distribution systems
  - medium/low voltage distribution systems
  - radial feeders
  - parallel feeders
  - ring main feeders
  - acts/legislation relating to distribution
- d) Substations
- purpose
  - location
  - layout
- e) Overhead and underground systems
- relative merits
  - applications
  - planning
  - installation
- f) Power distribution system electrical characteristics
- transmission and distribution systems
  - inductance, capacitance and resistance
- g) Voltage problems in a power distribution system
- low voltage
  - unbalanced voltages

- voltage rises
- h) Voltage regulation
  - autotransformers with OLTC
  - transformers with OLTC
  - static capacitors
  - load control
- i) Control of OLTC
  - regulation relays
  - control circuits
  - line drop compensation
- j) Power distribution system faults
  - type/classification of fault
  - typical causes/effects of faults
  - three-phase symmetrical fault levels
  - fault level limitation
- k) Voltage surges in a power distribution system
  - lightning surges
  - switching surges
  - typical surge levels
  - surge impedance, typical values
  - significance of the system surge impedance.
- l) Metering and metered quantities
  - purpose
  - energy
  - maximum demand
  - accuracy classes for metering systems
- m) Energy and demand meters
  - construction
  - operation
  - adjustments
  - testing
- n) Metering circuits
  - direct metering
  - instrument transformer metering
- o) Electronic metering systems and recording meters
  - types
  - applications
  - connections
- p) Load control
  - purpose
  - methods

#### 2.6.22.1 Electrical power system protection

Evidence shall show an understanding of protection methods and devices for electrical power systems to an extent indicated by the following aspects:

a) Protection fundamentals encompassing:

- purpose of protection
- features of a protection scheme

b) Instrument transformers for protection encompassing:

- Operating principles
- Applications of current transformers
- Applications of voltage transformers

c) Feeder protection encompassing:

- fuse protection
- overcurrent & earth fault
- sensitive earth fault
- unit schemes
- distance protection
- trip/close sequences for feeders
- recloser/sectionaliser systems

d) Transformer protection encompassing:

- overheating protection
- overcurrent protection
- restricted earth fault protection
- differential protection
- oil and gas devices

e) Busbar protection encompassing:

- types of fault
- requirements of busbar protection
- system protection
- frame-earth protection

f) Surge protection encompassing:

- voltage surges (revision)
- surge diverters
- arcing horns

### **2.6.22.2 Electrical power system operations**

Evidence shall show an understanding of electrical power system operations to an extent indicated by the following aspects:

a) Control of voltage encompassing:

- Conditions leading to voltage collapse and system disintegration.
- Effects on the system of high/low volts
- Voltage control devices

Note.

Examples are voltage regulators applied to generators and synchronous phase modifiers, electromagnetic voltage regulators, series and parallel capacitors, OLTC transformers and static Var

compensations (SVCs) such as saturated reactor compensations (SRs), thyristor controlled reactor compensators (TCRs), combined TCR/TSCs and the production of wave-form distorting harmonics and control devices.

- b) The importance of the location in the system of voltage control devices.
- c) The use of graphical methods to calculate the size of VAr regulating plant.
- d) Control of power encompassing:
- Base load and spinning reserve
  - Regulating machines
  - Rapid start plant,
  - Phase shifting transformers and various forms of load shedding.
  - Principles and practices of automated control of individual machines
  - Stations and transmission/tie-line elements.
  - Synchronising power
- e) The relationship between power and frequency encompassing:
- Limiting values
  - Machine stabilising
- Note.  
Examples are steam by-pass, rapid valving, slip stabilisers and over speed limiting.
- Use of single pole generator CB's.
  - Use of machine AVR's as angular stabilisers.
  - Damped and un-damped system oscillations.
  - Relationship between fault clearance times and system stability.
  - Calculation of critical clearance angles based on equal area criteria.
- f) Types of communication systems
- Note.  
Examples are telephone, power line carrier, dedicated cable, microwave links and fibre optics.
- Quantities and signals to be communicated.
  - Advantages and disadvantages of the various systems.
  - Equipment requirements.
- g) Transient over-voltages in power systems encompassing:
- Switching and lightning overvoltages and their effect on different plant items.
  - Transient over-voltage control and reduction using surge diverters, shield wires and CB are control.
  - Insulation systems, insulation coordination, insulation grading in plant items, bushings and capacitor bushings.
- h) Factors leading to the generation of corona encompassing:
- Consequences of corona.
  - Reduction of corona
- Note.  
Examples are conductor bundling, grading rings and conductor surface treatment.
- i) Power System Protection encompassing:
- Location of CT's in major plant items.
  - Earthing principles and devices.
  - Fault current control/limitation using neutral earthing compensators (NEC's), neutral point earth impedances, high conductivity shield wires and parallel feed

interlocking.

- Application of different types of protection.

### 2.6.22.3 Electrical power system transmission faults

Evidence shall show an understanding of electrical power system transmission faults to an extent indicated by the following aspects:

- a) Overview of the transmission system including lines, buses, transformers and cables. Line/bus layouts including single and double switching, breaker and a half systems and HV crossing methods.
- b) The principles involved in high voltage a.c. transmission including tower types and configurations, choice of towers or poles (economic and environmental), insulator types and configuration, types of conductors, their configuration and standard nomenclature. Typical line spacing and ground clearances. Line ratings based on ambient temperature. Conductor terminating and clamping equipment including vibration damping principles and equipment.
- c) The principles involved in d.c. transmission including the economics, harmonic generation, VAR requirements and protection difficulties. Types of connections and transformer requirements. Advantages and disadvantages of d.c. transmission. Typical overseas systems. Likely (future) use in this country.
- d) The principles of operation, voltage and current range, breaking capacity and field of use of the following types of circuit breakers.
  - bulk oil
  - small oil volume
  - air break
  - air blast
  - air puffer
  - vacuum and
  - SF6 (double pressure and puffer types).
- e) The types of isolators in use. Examples include duo-roll, blade and scissor type.
- f) Circuit breaker auxiliary systems including:
  - high pressure air systems and air storage and handling processes
  - d.c. systems including battery types, charging and protection systems and earth fault detection systems
  - SF6 conditioning, storage and handling system
- g) The characteristics of lines and cables including the calculation of R, X and B for different arrangements of conductor. Typical values for actual lines. Transposition. Models based on line length. Voltage and line regulation. The transmission of power (P) and VARs(Q).
- h) Control of voltage. Conditions leading to voltage collapse and system disintegration. Effects on the system of high/low volts. Voltage control devices including:
  - voltage regulators applied to generators and synchronous phase modifiers
  - electromagnetic voltage regulators
  - series and parallel capacitors
  - OLTC transformers and static Var compensations (SVCs)
- i) Range of devices covered by SVCs including:
  - saturated reactor compensations (SRs)
  - thyristor controlled reactor compensators (TCRs)

- combined TCR/TSCs and
  - production of wave-form distorting harmonics and control devices
- j) Importance of the location in the system of voltage control devices
- k) Use of graphical methods to calculate the size of Var regulating plant
- l) Types of communication systems including telephone, power line carrier, dedicated cable, micro-wave links and fibreoptics. Quantities and signals to be communicated. Advantages and disadvantages of the various systems. Equipment requirements
- m) Transient over-voltages in power systems. Switching and lightning overvoltages and their effect on different plant items. Transient over-voltage control and reduction using surge diverters, shield wires and CB are control. Insulation systems, insulation co-ordination, insulation grading in plant items, bushings and capacitor bushings
- n) Factors leading to the generation of corona. Consequences of corona. Reduction of corona including conductor bundling, grading rings and conductor surface treatment

#### 2.6.22.4 Distributive generation systems

Evidence shall show an understanding of distributive generation systems to an extent indicated by the following aspects:

- a) Concept and application
- b) Anti-islanding control and protection
- c) System monitoring and load management.

#### 2.6.22.5 Electrical power system protection diagnostic

Evidence shall show an understanding of diagnosing faults in electrical power system protection to an extent indicated by the following aspects:

- a) Protection scheme requirements
  - Requirements of a protection scheme
 

Note:  
Includes relationship to primary system design, purpose of protection, safety of persons, protection of plant, system instability, system break up, loss of customers, loss of revenue, protection zones, restricted schemes, unrestricted schemes, duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity, reliability
  - Components of a protection scheme
 

Note:  
Includes current transformers, potential transformers, summation current transformers, interposing transformers, multitapped transformers, all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor based relays, gas relays, thermal sensors, hardwired communication, powerline carriers systems, microwave systems, fibre optic systems, need for isolation, need for interfacing
  - Protection applied to buses
 

Note:  
Includes overload, differential, earth leakage, structure leakage, combined schemes, protection overlap
  - Protection applied to transformers
 

Note:  
Includes biased differential, gas, winding temperature, oil temperature
  - Protection applied to single/radial lines
 

Note:  
Includes overcurrent, earth leakage, slow earth leakage, distance, auto reclose, sectionalising, over voltage

- Protection applied to interconnected lines

Note:

Includes overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current comparison, distance, impedance, admittance, offset

b) Discrete protection systems

- Earth fault protection

Note:

Includes master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination, backup protection

- Overcurrent protection

Note:

Includes feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination, backup protection

- Alarms and controls

Note:

Includes auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, over temperature schemes

c) Interdependent protection systems

- Overcurrent and earth leakage intertripping, interlocking and blocking

Note:

Includes logic mapping, master control, electromechanical, electronic, shading coils

- Pilot wire, phase comparison

Note:

Includes opposed voltage schemes, circulating current schemes, location of components of a scheme, pilot supervisory techniques,

- Load shedding, voltage control, parallel operation, load rejection
- CB failure protection
- Reclose systems

Note:

Includes applications, single shot, multishot, blocking schemes, synchronisation checking

d) Complex protection systems

- Distance

Note:

Includes characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes, bus zone

- Differential, transformer differential, bus overcurrent

Note:

Includes principles, feeder protection, transformer protection, bias systems, harmonic restraint, CT connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, CT connections, special considerations, digital systems

- Types of revenue metering
- Applications of SCADA
- Complex protection systems for communications
- Harmonic control
- Point on wave switching

### 2.6.22.6 Electrical power distribution systems diagnostic

Evidence shall show an understanding of diagnosing faults in power distribution systems to an extent indicated by the following aspects:

a) Distribution system overview including:

- regulatory conditions of supply and utilisation
- compliance with Australian Standards.
- reticulation system including overhead/underground, urban/rural, HV customers and high-rise building systems. The effects of industrial customers
- methods used to ensure continuity of supply.
- types of substations in current use.
- systems of distribution used, (primary and secondary)
- voltage levels, power factor, wave-form distortion and transient loading
- supply quality
- load curve profiles (residential/industrial/commercial)
- types of feeders
- distribution systems (urban, rural single-phase systems, SWER, spur, parallel and ring systems etc.)

b) Overhead lines and installation

- industry and safety regulations
- overhead conductors
- conductor material
- current rating factors (heating, voltage drops, power losses)
- aerial bundled cables (HV and LV)
- covered conductors

Note:

The characteristics of lines and cables including the calculation of R, X and B for different arrangements of conductor. Typical values for actual lines. Transposition. Models based on line length. Voltage and line regulation

- overhead line poles
- types (wood, concrete and steel)
- installation of poles (tooling, rake, life, labelling, sinking)
- maintenance of poles – above & below ground
- pole strength and loads
- crossarms
- types and standard sizes
- insulators
- insulation types
- types (pin, suspension or disc, shackle)
- creepage, necessary clearances
- arcing horns, insulator mounting
- structure types
- mechanical properties (working strength, maximum tension, limiting size)
- interpretation of stringing charts

- determination of sag (by calculations or measurement and/or tension measurement)
  - sight and wave sagging, sag correction
  - stays
  - components, anchorage
- c) Use of design schedules
- sample design problems
- Note:  
Examples of common design practice line, voltage, structure types used, line deviation, span sag, crossarms, insulators and stays wind loading and line deviation loading basic surveying
- measurement of levels, deviation angle and compass bearings
  - perform survey of short distribution line extension of produce field notes
- d) Underground cables
- cable types, ratings, core material, design considerations, cable dielectrics, insulating materials and abbreviations, electric stress, cable volt drop and volt drop calculations, cable termination, joints and installation.
  - induction and eddy currents
  - cable testing, cable fault location
  - cable drawing
- e) Voltage regulations of feeders and associated equipment
- terminology used: distribution system, service line, customer's terminals, customer voltage, utilisation voltage, base voltage, voltage variation and bandwidth
  - voltage limits and effects of voltage variation
  - causes of variation: inductance, capacitance and reactance of distribution lines, transformers
  - methods of voltage control: off-load, on-load tap changers, voltage regulating relays, line drop compensation, different types of voltage regulators
  - voltage profiles: principles, effect on voltage profiles, limits of voltage, voltage drops due to LV mains transformers, tapsettings feeder and service lines
  - determining volt drops for components within the profile.
- f) Control of voltage. Conditions leading to voltage collapse and system disintegration. Effects on the system of high/low volts. Voltage control devices including:
- voltage regulators applied to generators and synchronous phase modifiers
  - electromagnetic voltage regulators
  - series and parallel capacitors
  - OLTC transformers and static Var compensations (SVCs)
- g) Range of devices covered by SVCs including:
- saturated reactor compensations (SRs)
  - thyristor controlled reactor compensators (TCRs)
  - combined TCR/TSCs and
  - production of wave-form distorting harmonics and control devices
- h) Importance of the location in the system of voltage control devices
- i) Types of communication systems including telephone, power line carrier, dedicated cable, micro-wave links and fibreoptics. Quantities and signals to be communicated. Advantages and disadvantages of the various systems. Equipment requirements
- j) Transient over-voltages in power systems. Switching and lightning overvoltages and their effect on different plant items. Transient over-voltage control and reduction using surge

diverters, shield wires and CB are control. Insulation systems, insulation co-ordination, insulation grading in plant items, bushings and capacitor bushings

- k) The principles of operation, voltage and current range, breaking capacity and field of use of the following types of circuit breakers.
  - bulk oil, small oil volume, air break, vacuum and SF6 (double pressure and puffer types).
- l) The types of isolators in use. Examples include duo-roll, blade and scissor type.
- m) Circuit breaker auxiliary systems including:
  - d.c. systems including battery types, charging and protection systems and earth fault detection systems
  - SF6 conditioning, storage and handling system

### 2.6.23 Marine electrical systems overview

Evidence shall show an understanding of marine electrical systems to an extent indicated by the following aspects:

- a) Marine electrical systems
  - Switchboards
  - Instrumentation
  - Earthing
- b) Alternators
  - Construction
  - Characteristics
  - Synchronised operation
- c) Switchboards and protection
  - Purpose
  - Testing and maintenance
  - Equipment removal
- d) Lighting systems
  - Purpose
  - Types
- e) Power supplies
  - UPS systems
  - Batteries
  - Maintenance
  - Safety procedures - battery banks
- f) Cathodic protection
  - Purpose
  - Operating parameters
  - Corrosion factors
- g) Safety
  - Equipment
  - Codes and Regulations
- h) Electrical system commissioning requirements and surveys

### **2.6.24.1 Switchgear/controlgear**

Evidence shall show an understanding of switchgear/controlgear to an extent indicated by the following aspects:

- a) Types and applications
- b) Operating principles
- c) Interlocking systems
- d) Control and protection
- e) Installation requirements

### **2.6.24.2 Control panel wiring**

Evidence shall show an understanding of control panel wiring to an extent indicated by the following aspects:

- a) Equipment layout methods and accessories
- b) Connection identification methods
- c) Wiring techniques

### **2.6.25 Hand power tools repairs**

Evidence shall show an understanding of hand power tools to an extent indicated by the following aspects:

- a) Types, applications, operating principles and characteristics
- b) Motors and drive mechanisms
- c) Control and over current protection methods and devices
- d) Typical hand power tool faults encompassing:

- Motor faults
- Power supply faults

Note.

Examples include open circuit or tripped circuit in cord connected tools and battery charging and discharging problems in battery operated tools.

- Control faults
- Mechanical faults

### **2.6.26 Appliance motors and circuits**

Evidence shall show an understanding of appliance motors and circuits to an extent indicated by the following aspects:

- a) Fundamental a.c. circuit principles
  - Components of a circuit – source, path, load and control
  - Notions of open circuit, closed circuit, and short circuits
- b) Circuit - basic configurations encompassing:
  - Single source Series, parallel, and series-parallel and circuits configurations
  - Relationship between voltage, current and impedance (Ohms law)
  - Components of impedance in a circuit

Note:

Confined to basics of resistance, inductive reactance and capacitive reactance

- c) Electromagnetic induction basics encompassing:
- Induction principles
  - Motor action and generator action
  - Transformer principles
  - Risks associated with electromagnetic induction
- d) Single phase supply and three phase supplies encompassing:
- safety testing and isolation of single and three phase circuits
  - sine waves showing the nature of EMF and current in single and three phase supplies
  - Star and Delta connections of a three phase a.c. supply
- e) Electrical supply and distribution within a building or premises encompassing:
- purpose and typical arrangement of main switchboards and distribution boards
  - arrangement of circuits
  - methods and devices for protection against direct and indirect contact with conductive parts
  - methods and device for protection against overload current and fault currents
  - the need for earthing and methods of testing for sound earthing.
- f) Operation, construction and applications of three phase induction motors encompassing:
- Methods for determining polarity magnetic flux in relation to current flow in straight conductors and solenoids
  - circuit operating characteristics
  - characteristics of the magnetic field produced by a three phase winding
  - calculated speed of rotation of the rotating magnetic field
  - basic principle of operation, construction and applications of a three phase induction motor
  - three phase induction motor connections
  - reversing the direction of rotation of a three phase induction motor
  - equipment and methods for testing the motor winding resistance and insulation properties
  - effects of incorrect wiring a three phase motor.
- g) Operation, construction and applications of three phase motor starters encompassing:
- regulatory requirements for starting, control and protection of induction motors
  - operating principle, construction and applications of motor starters
  - main advantages and disadvantages of a motor starter
  - motor starting circuit diagrams
  - starter and three phase motor connections
  - Method of testing and fault finding three phase motor starters.
- h) Components and arrangement of three phase motor circuits encompassing:
- purpose of motor protection
  - three phase motor protection devices and their applications
  - construction and operating principle of thermal and magnetic motor protection
  - connection of thermal overloads in a three phase motors, starters circuit
  - Methods of testing and fault find three phase motor thermal overloads
  - electrical features of motor protection fuses

- effects of under and over voltage on motor circuits
  - effects of repetitive starting and /or reversing motors
  - special requirements for motor protection, in high humidity or moist environments, high temperature areas and corrosive atmospheres
- i) Construction, operation and applications of split phase and single phase motors and controls encompassing:
- principle of operation of a split phase motor and starters
  - construction and basic characteristics of a split phase motor and starters
  - typical applications of a split phase motor
  - split phase motor and starter circuit diagrams
  - reversing direction of rotation of split phase motor
  - methods of testing a split phase motor to identify terminal connections.
- j) Operating principles, construction and applications of capacitor and shaded pole, single phase motors and controls encompassing:
- types of single phase induction motors
- Note.  
Examples are capacitor start, capacitor start/induction run, permanently split capacitor, shaded pole
- the principle of operation of each motor type and associated control.
  - operating characteristics and typical application of each motor and control.
  - single phase induction motors motor and starter circuit diagrams
  - reversing direction of rotation of single phase induction motors
  - methods of testing a single phase induction motors to identify terminal connections.
- k) Operating principles, construction and applications of series universal motors encompassing:
- principle of operation of a series universal and synchronous motor
  - function of the basic parts of a series universal and synchronous motor
  - operating characteristics and typical uses for a series universal and synchronous motor
  - reversing direction of rotation of series universal and synchronous motor
  - list the common series universal and synchronous motor faults and possible causes.
- l) Speed control, protection devices and diagnostic testing of single phase induction motors encompassing:
- principle of speed control for single phase induction motors
  - common faults in single phase induction motors and their control equipment
  - protection devices used with single phase motors and their operation.

### 2.6.27.1 Electric heating appliances

Evidence shall show an understanding of electrical heating appliances to an extent indicated by the following aspects:

a) Heating principles and applications

Note.

Principles include resistance, induction and microwave.

b) Types of heating appliances, their operating principles and characteristics

c) Heating circuits and controls

d) Typical faults

### 2.6.27.2 Microwave ovens

Evidence shall show an understanding of microwave ovens to an extent indicated by the following aspects:

- a) Microwave cooking basics encompassing:
  - Properties of microwaves
  - Biological effects of microwaves
  - Fundamental microwave oven operations
- b) Microwave oven performance encompassing:
  - Radiation leakage
  - Power output measurement
  - Oven leakage safety system
  - Magnetron tests and measurements
  - Interlocks
  - Thermal cut outs and thermostats
  - Stirrer cooling and turntable systems
- c) Power control systems encompassing:
  - Hazards of microwaves and associated high voltages
  - High/low power selection
  - Duty cycle control systems
  - Basic circuit diagrams
  - New microwave oven technology such as inverter microwave ovens
- d) Auto-cook facilities encompassing:
  - Temperature control cooking systems
  - Humidity sensor cooking systems
  - Infrared sensor cooking systems
  - Convection microwave oven systems
- e) Service, fault finding and repair encompassing:
  - Manufacturers' data
  - Safety checks
  - Operating sequence
  - Typical fault symptoms
  - Test equipment
  - Fault identification
  - Fault location using test equipment and service manuals
  - Repairs techniques

### 2.6.28 Motor windings

Evidence shall show an understanding of motor windings to an extent indicated by the following aspects:

- a) Principles and construction encompassing:
  - direct-current machine types

- construction of direct current machine
  - types of armature windings
  - parallel circuits in armature windings
  - value of generated e.m.f.
- b) Direct current armature windings encompassing:
- terms used in armature winding
  - effects of chording
  - lap and wave windings
  - progressive and retrogressive windings.
- c) Simplex lap windings encompassing:
- simplex lap armature winding
  - commutator pitch
  - number and position of brushes
  - characteristics of simplex lap windings
  - equalising connections for armature windings
  - applications for lap windings.
- d) Simplex wave windings encompassing:
- simplex wave armature winding
  - commutator pitch
  - number and position of brushes
  - dummy coils
  - characteristics of simplex wave windings
  - applications of wave windings
  - comparison of lap and wave windings
  - armature winding calculations.
- e) Commutation and interpoles encompassing:
- principles of commutation
  - conditions for sparkless commutation
  - methods used to reduce sparking
  - resistance commutation
  - e.m.f. commutation
  - interpoles or commutating poles
  - advantages of interpoles.
- f) Alternator windings encompassing:
- elementary single-phase stator winding
  - elementary three-phase stator winding
  - half-coil and whole-coil windings
  - concentrated and distributed windings
  - chain, lap and wave windings
  - pole-pitch and coil-span
  - half-coil winding for a three-phase alternator
  - whole-coil stator winding for a three-phase alternator
- g) Breadth factor and sinusoidal output encompassing:

- breadth factor
  - e.m.f. equation for an alternator
  - methods of obtaining sinusoidal wave form
  - star and delta connection of alternator windings
- h) Rating, cooling and regulation encompassing:
- rating of alternators
  - cooling of alternators
  - the voltage regulator
- i) Testing techniques encompassing:
- continuity
  - insulation testing
  - use of 'growler'
  - magnetic field testing

#### **2.6.29 Coil winding basics**

Evidence shall show an understanding of basic of coil winding to an extent indicated by the following aspects:

- a) Coil data
- b) Coil former types and construction/set up
- c) Coil winding machines
- d) Coil insulations.

#### **2.6.30 Coil testing**

Evidence shall show an understanding of coil testing to an extent indicated by the following aspects:

- a) Testing devices and their purpose
- b) Types of tests
- c) Testing techniques

#### **2.6.31.1 Electrical machine winding basic**

Evidence shall show an understanding of the basic techniques in insulating and placing coils for electrical static and rotating machines to an extent indicated by the following aspects:

- a) Electrical machine insulation processes
- b) Coil types
- c) Coil placement techniques

#### **2.6.31.2 Low voltage three phase motor winding techniques**

Evidence shall show an understanding of the techniques of winding three phase motors to an extent indicated by the following aspects:

- a) Electrical machine insulation types and applications
- b) Coil placement techniques

- c) Coil connection arrangements and terminations
- d) Winding insulation methods

### 2.6.31.3 Direct current motor winding techniques

Evidence shall show an understanding of the techniques of winding direct current motors to an extent indicated by the following aspects:

- a) Critical details and measurements when stripping a stator encompassing:
  - Winding types
    - Note.
    - Examples are wave winding and a lap winding with equalisers
  - Winding diagram
  - Tests carried out on steel bands removed from an armature
- b) Procedures and precautions required when inspecting and/or re-using a commutator encompassing:
  - Method of removing the armature leads from the risers of a TIG welded commutator.
  - Dimension to be checked on a TIG welded commutator.
  - Features of TIG welded and soft soldered commutators.
  - Relationship between the position of the slot a coil is in and the commutator segments it is connected to.
  - Purpose of commutator wear ring.
- c) Outline the procedures for checking the condition of a stripped core and commutator in preparation for rewind encompassing:
  - Describe the sequence of events between the removal of an old winding and the start of rewinding.
  - Describe the method of carrying out the core loss test, the effect this test has on the core and expected test results.
  - Describe two methods of overcoming hot spots in an armature core.
  - Detail the tests and checks made to a commutator before it can be reused.
- d) Select the appropriate insulation for a particular application with reference to manufacturers' recommendations and standards encompassing:
  - Conductor insulations available for use in d.c. formed coils, their dielectric strength and temperature rating.
  - Various insulations used on the slot portion and overhang of a d.c. armature encompassing:
    - Note
    - Examples may include: B stage insulation, VPI insulation
  - Properties, method of application and specific uses for the above insulations.
- e) Calculations and insulation specifications for preparing coils and equalisers for rewinding with reference to manufacturers' specifications.
  - Special characteristics of copper used in formed armature coils.
  - Half coil length and the amount of copper required for a set of coils, given the dimensions, the voltage and winding pitch of an armature.
  - Preparation of copper prior to insulating the coils and equalisers for armatures
    - Note:
    - Examples may include: commutators, TIG welded, soft soldered

- Insulation specification for each of the following impregnation systems given an armature, voltage rating, temperature rise and conductor size.

Note:

Examples may include; solvent based impregnating system, a VPI impregnating system

f) Procedures and precautions required for fitting the coils and equalisers to the armature, wedging, connecting and banding with reference to manufacturers' specifications.

- Method of insulating the overhang support rings.
- Procedures required between the insulating of the support ring and the stage of fitting the temporary band.
- Method of fitting a temporary band and it's purpose.
- Purpose of stoving a large armature after the fitting of the temporary band.
- Method of making the joints.

Note:

Examples are: a soft soldered commutator, a TIG welded commutator

- Calculation of turns required for both glass and steel bands given the armature dimensions, copper size, mean length of turn and speed.
- Features and use of glass and steel bands

g) Materials, procedures, tests and precautions required during and after the impregnation of completed armature.

- Precautions to be taken when handling and using varnishes and resins.
- Important features of an oven used to cure large impregnated machines.
- Application and features of various impregnating materials

Note.

Examples are water based varnish, Xylol base varnish and 100% solids resin

- Method of carrying out a gel test on a resin and a viscosity test on a varnish
- Typical quality procedures carried out on an impregnating varnish.
- Procedure and precautions for carrying out the a hot dip impregnation and a VPI impregnation

h) Describe methods for preparing and testing a bare commutator.

- Describe the method of diamond turning a commutator.
- Describe the method of undercutting and de-burring a commutator.
- Detail the method of insulating the exposed Vee ring.
- Explain the method and purpose of seasoning a commutator.
- Procedures for Electrical testing procedures of a bare commutator.

i) Procedures and precautions to be followed when performing static electrical testing of a completed rewind according to Australian, British and IEC standards encompassing:

- Types and purpose of tests
- Testing safety precautions
- Testing procedures

Note.

Example of tests are repetitive surge test, polarisation index (PI) test, induction/growler test an electrical test on the steel bands cold resistance test and polarity test.

- Interpretation of test results
- Calculation of winding cold resistance and resistance across adjacent bars of a commutator.

#### 2.6.31.4 High voltage three phase motor winding techniques

Evidence shall show an understanding of the techniques of winding high voltage three phase motors to an extent indicated by the following aspects:

a) Critical details and measurements when stripping a stator encompassing:

- Winding types

Note.

Example are hairpin wound stator and lap wound stator

- Winding diagram
- Wedges of a radially ventilated machine
- Factors to be considered when selecting cables for a stator.

b) Procedures for checking the condition of a stripped in preparation for rewind encompassing:

- Manufacturers' specifications.
- Sequence of events between the removal of the old winding and the start of rewinding.
- Core loss test, the effect this test may have on the core and expected test results
- Methods of overcoming hot spots in a stator core.
- Level of insulation required to insulate the steel bracing rings that support the overhang.
- Difference between the slot liners and packers of a 3.3kV and a 6.6 kV machine.

c) Procedures for the fitting of coils to core, wedging and bracing.

- Significance of the slot portion of coils for machines above 3.3 kV
- Method of inserting the coils of a ribbon winding into slots.
- Effects of undue mechanical stress on B stage insulated coils.
- Importance of coil pitch and why it is important.
- Sequence of events in fitting the first pole pitch group of coils in a lap winding
- Sequence of events in fitting the coils of a concentric winding
- Purpose and location of the excess packing in a slot.
- Difference between the wedges for a lap and hairpin winding.
- Method of fitting a wedge.
- Difference that may be encountered between the wedges for a radial ventilated and the wedges for an axially ventilated machine.
- Methods used to brace and strengthen the overhang of a lap winding and a hairpin winding

d) Procedures for making inter turn and inter coil connections on a hairpin winding and inter coil connections on a lap and bar winding encompassing:

- Sequence of events in making turn to turn connections, and insulating the turns of a lap winding

Note.

Connection methods include silver solder or brazing and soft solder

- Sequence of events, from hand forming the coil to final insulation, in making the turn to turn connections in a hairpin winding, using a welded joint.
- Sequence of events in making the coil to coil connections in a bar winding.

e) Testing according to British and IEC standards.

Note.

Examples of testing are 3.3 kV B stage insulated winding test, 6.6 kV B stage insulated winding and VPI winding test.

f) Materials, procedures, tests and precautions required during and after the impregnation of completed windings according to Australian, British and IEC standards.

- Precautions to be taken when handling and using varnishes and resins.
- Important features of an oven used to cure large impregnated machines.
- Application and features of various impregnating materials

Note.

Examples are water based varnish, Xylol base varnish and 100% solids resin

- Method of carrying out a gel test on a resin and a viscosity test on a varnish
- Typical quality procedures carried out on an impregnating varnish.
- Procedure and precautions for carrying out the a hot dip impregnation, a flood coat impregnation and a VPI impregnation
- Tests to be carried out after impregnation and bake on a 3.3kV B stage insulated winding, a 6.6 kV B stage insulated winding and a VPI winding

g) Winding to terminal connections according to British and IEC standards.

- Criteria for selection of winding to terminal cables

Note.

Examples are voltage rating, full load current and fault capacity.

- Common types of terminal boxes and their structure.

Note.

Example are phase segregated, phase separated and phase insulated

- Method of making the joint between winding and terminal cables and insulating such a joint.

h) Procedures and precautions to be followed when performing static electrical testing of a completed rewind according to Australian, British and IEC standards encompassing:

- Types and purpose of tests
- Testing safety precautions
- Testing procedures

Note.

Example of tests are repetitive surge test, loss tangent test, polarisation index (PI) test, cold resistance test and polarity test.

- Interpretation of test results
- Calculation of winding cold resistance and line and phase resistance

### 2.6.31.5 Electrical machines, mechanical components

Evidence shall show an understanding of the mechanical components of electrical machines to an extent indicated by the following aspects:

a) Types of bearings used in electric motors:

b) Bearing clearances.

c) Techniques for removing and fitting bearings encompassing:

- shafts
- housings

d) Handling and storage of bearings.

e) Lubrication encompassing:

- Safety and environment issues in handling and disposing of lubricants

- Lubrication methods
- f) Calculation of bearing life.
- g) Bearing damage and remedial action
- h) Types of couplings, applications
- i) Fitting and aligning couplings
- j) Types of belts and their applications
- k) Fitting and aligning pulleys
- l) Machine cooling/ventilation methods and components

#### **2.6.31.6 Electrical machines, performance monitoring**

Evidence shall show an understanding of the performance monitoring of electrical machines to an extent indicated by the following aspects:

- a) Methods of testing the condition of bearings.
- b) Methods of testing the condition of windings and terminal boxes.
- c) Methods of testing the condition of the coolers
- d) Problems likely to be created due to lack of maintenance on brush gear.
- e) Method of testing the general condition of a machine by vibration analysis
- f) Methods of checking the condition of couplings, pulleys, belts and the like.
- g) Determining machine operating efficiency

#### **2.6.32 Field power and distribution systems**

Evidence shall show an understanding of field power and distribution systems to an extent indicated by the following aspects:

- a) Types applications and components
- b) Regulator and safety requirements and standard
- c) Equipment installation and commissioning
- d) Testing requirements

#### **2.6.33 Variable speed drives for a.c. motors**

Evidence shall show an understanding of a.c. variable speed drive to an extent indicated by the following aspects:

- a) Methods and operating principles
- b) Installation requirements
- c) Filtering
- d) Performance characteristics
- e) Set up and commissioning
- f) Common faults: their symptoms and causes.

#### **2.6.34 Variable speed drives for d.c. motors**

Evidence shall show an understanding of d.c. variable speed drive to an extent indicated by the following aspects:

- a) Methods and operating principles
- b) Installation requirements

- c) Filtering
- d) Performance characteristics
- e) Set up and commissioning
- f) Common faults their symptoms and causes.

### 2.6.35 Servomechanism systems

Evidence shall show an understanding of servomechanism systems to an extent indicated by the following aspects:

- a) Servomechanism terminology and concepts encompassing:
  - null, error signal, feedback and reference signal
  - damping: under, over, critical
  - hunting
  - overshooting
  - deadband
  - response time
  - time lag
- b) Difference between an open loop and a closed loop system encompassing:
  - the operation of a servomechanism system to block diagram level identifying the components:
  - command transmitter
  - error detector
  - amplifier
  - summing point/network
  - servo
  - position feedback
  - rate feedback
  - acceleration feedback
  - modulator/demodulator
- c) Differences in operation between types of servomechanism systems encompassing:
  - a.c., d.c. and hybrid types
  - advantages and limitations
- d) Causes of hunting.
- e) Inspection, testing, and alignment of a servomechanism system
- f) Common faults their symptoms and causes.
- g) Programming and configuration of a PLC driven servo system

### 2.6.36 Synchronous machine diagnostics

Evidence shall show an understanding of synchronous machine diagnostics to an extent indicated by the following aspects:

- a) a.c. generators – construction, types and cooling encompassing:
  - construction of stator and rotor windings
  - rotor construction (cylindrical and salient pole)
  - advantages of rotating field construction

- excitation methods
  - cooling methods
  - prime movers
- b) a.c. generators – operating principles and characteristics encompassing:
- a.c. generator equivalent circuits (synchronous reactance and resistance components)
  - tests – open circuit, short circuit, stator impedance
  - voltage regulation, island generator's terminal voltage load power factor
  - determination of excitation voltage and load angle
- c) Synchronising a.c. generators encompassing:
- conditions for synchronising (infinite bus)
  - methods for synchronising (lamp methods, synchroscope)
  - alternator load sharing, parallel operation
- d) a.c. generators power, torque and efficiency encompassing:
- power input, input torque, speed
  - power losses
  - output power, load power factor, rotor angle, pu power
  - efficiency
  - performance chart interpretation
- e) Voltage regulation (AVR) encompassing:
- need for AVR's
  - features of AVR's
  - effects of rotor inductance
  - connections of AVRs
  - operation of AVRs
- f) a.c. generator operational stability encompassing:
- power output, VAR effects, rotor angle, excitation
  - control of VAR (OLTC transformers)
  - voltage dependant nature of stability
  - critical clearance angle of a.c. generator
  - stability limits
- g) a.c. generator protection encompassing:
- restricted, unrestricted primary, back up and duplicated protection
  - overcurrent, short circuit, differential, reverse power, load unbalance, rotor overload, loss-of-field, rotor earth fault, station earth fault, under frequency protection
  - external fault protection
- h) Induction generator encompassing:
- types operating principles, characteristics
  - excitation methods
  - losses and efficiency
  - synchronising and paralleling
- i) Three phase synchronous motors encompassing:

- construction – rotor, stator, windings
- excitation methods
- operating principles (equivalent circuits, synchronous impedance)
- hunting and stability limits
- power factor correction
- paralleling and synchronisation techniques
- starting methods
- braking methods

### **2.6.37 Induction motors diagnostics**

Evidence shall show an understanding of induction motors diagnostics to an extent indicated by the following aspects:

a) Construction of polyphase induction motors encompassing:

- squirrel cage motors
- slip-ring motors

b) Operating principles of polyphase induction motors encompassing:

- rotating magnetic field torque slip
- MMF relationships
- Leakage fluxes

c) Speed-torque relationships in induction motors encompassing:

- maximum torque
- torque – slip relationships
- types of motor squirrel cages
- power flow in the motors
- power distribution
- torque units
- slip ring rotors

d) Induction motor performance testing encompassing:

- no-load tests
- locked rotor tests
- development of motor equivalent circuit from test results
- analysis of motor performance using circle diagrams

e) Induction motor starters encompassing:

- starting requirements
- type of starters
- starting torque
- starting dynamics
- static friction
- mechanical loads
- starting duration

f) Reduced voltage starting encompassing:

- starting dynamics

- change over conditions
  - starting duration
  - acceleration curves
- g) Speed control of induction motors encompassing:
- constant torque, constant power concepts
  - torque-flux-voltage relationships
  - rotor resistance control
  - stator impedance control
  - variable frequency control (e.g. PAM, PWM, Flux vector control)
- h) Braking of induction motors encompassing:
- electrical braking systems (plugging, d.c. dynamic, regenerative, capacitor-magnetic)
  - mechanical braking systems (mechanical drum, demag, eddy current)
- i) Motor protection encompassing:
- overload
  - earth fault
  - phase failure
- j) Motor selection encompassing:
- selection criteria
  - RMS rating
- k) Induction motor maintenance/repair encompassing:
- routine maintenance schedules
  - type of repairs (mechanical, electrical)
- l) Single phase induction motors encompassing:
- construction
  - operating principles
  - speed-torque relationships
  - testing

### **2.6.38 Direct current machines diagnostics**

Evidence shall show an understanding of direct current machines diagnostics to an extent indicated by the following aspects:

- a) Basic d.c. machine construction and operation encompassing:
- application of d.c. machine
  - construction of d.c. machines
  - d.c. machine connections
  - insulation
  - ratings
  - cooling paths
  - bearings
  - general maintenance of d.c. machines
- b) Construction and use of lap and wave windings encompassing:
- coils and elements

- generated voltage equation for generator
- generated voltage equation for motors
- application of lap and wave windings

c) Commutation process encompassing:

- use of interpoles
- loading of machines
- brush shifting
- brush selection
- classes of brush grades

Note:

Examples include: natural graphite, hard carbon, electrographite, metal-graphite, metal-carbon, “treated” grades

- carbon brush contact characteristics

Note:

Examples include: specific resistance, thermal conductivity, density and porosity, elastic properties, contact properties

- carbon brush factors

Note:

Examples are: pressure, current, polarity, speed

- brush construction

Note:

Examples are: dimensions, tolerances, preferred sizes, surfaces, edges, bevels, flexible shunts, connection of flexible shunt to brush, insulation of flexible connections

- brush holders

Note:

Examples are: types, brush angles, trailing holders, reaction holders, top bevel angles, reversible rotation, cantilever holders, effective arc of contact, construction of brush holders, pressure mechanism

- mounting of brush holders and brushes

Note:

Examples are: clearances, brush angle, brush arm spacing, alignment, staggering, brush bedding, brush pressure

- brush operation

Note:

Examples are: temperature rise, number and size of brushes, current distribution between brushes, slotting brushes, polarity effects, arc of contact, materials for commutators, mica

- selection of brush grades

Note:

Examples are: machine data, current density, commutator peripheral speed, brush arc, pitch of segments, number of segments covered by brush, cooling surface

d) Armature reaction in d.c. machines

- effect of armature reaction on d.c. machine characteristics
- use of compensating winding

e) d.c. generators

- performance of generators supplying various loads
- voltage regulation as a percentage or per unit value
- operation in parallel

f) d.c. motors

- shape of motor speed/torque curves
- reversal of machines

g) Starting of d.c. motors

- types of d.c. motor starters in use
- d.c. motor protection

h) Speed regulation and speed control of d.c. motors

- methods in use
- effect on motor design and operation caused by the use of SCR
- speed control equipment

i) Braking of d.c. motors

- Plugging
- Dynamic
- Regenerative
- Mechanical

j) Losses and efficiency

k) Acceleration of d.c. motors and loads

- characteristics of typical loads
- matching loads to a suitable motor
- heating of windings
- derating of motors

l) Special d.c. motors construction, operation and applications

- permanent-magnet motors
- brushless motors (e.c. motors)
- coreless and moving coil motors
- linear motors
- printed circuit motor
- stepping motors
- voice-coil motors

m) Maintenance of d.c. machines

- routine maintenance
- breakdown repairs

n) types of faults

- brushes/brush gear problems

Note:

Examples are: sparking, excessive heating, excessive wear of brushes, commutator or slip rings, bad surface conditions, excessive maintenance, flexible burning, flexible corrosion, separation or grooving, blackening, copper picking, copper dragging, brush noise

o) adjustment of machines

- correct brush position
- machining and finishing of commutators.

## 2.6.39 Lubrication of lift components

Evidence shall show an understanding of lubrication of lift components to an extent

indicated by the following aspects:

- a) Purpose of lubrication encompassing:
  - Corrosion protection,
  - Friction reduction,
  - Cooling,
- b) Lubricant loss and loss estimation
- c) Suitability Oils, Greases, Coolants, Rust preventative, Solvents
- d) Selection of lubricant encompassing:
  - Viscosity
  - Types to suit device operation
- e) Application methods and quantities encompassing:
  - Hand, Grease guns,
  - Oil cans,
  - Pressure lubricators,
  - Oil misters,
  - Level indicators,
  - Estimating quantities,
  - Lubrication points
  - Automatic lubricators

#### **2.6.40 Lift systems, roping**

Evidence shall show an understanding of lift systems roping to an extent indicated by the following aspects:

- a) Single wrap encompassing:
  - Hoisting
  - Governor
  - Tappet
  - Compensator
  - Selector
- b) Multiple wrap encompassing:
  - Hoisting
- c) Types of ropes encompassing:
  - Normal lay
  - Langs lay
- d) Rope attachments encompassing:
  - Standards ends
  - Splices
  - Wedges sockets
  - Talurit fitting
  - Babbit sockets
  - Secon fitting

### **2.6.41 Lift systems, rope inspection**

Evidence shall show an understanding of lift systems rope inspection to an extent indicated by the following aspects:

- a) Inspection of ropes encompassing:
  - Requirements of Lift Code/enterprise
  - Purpose
  - Wear
  - Broken strands
  - Diameter
  - Deformation
  - Corrosion
  - Lubrication
  - Tension
- b) Rope stretch encompassing:
  - Requirements of Lift Code/enterprise
  - Counterweight clearance
  - Compensatory equipment
- c) Inspection of rope attachments encompassing:
  - Requirements of Lift Code/enterprise
  - Rope anchor rods
  - Castings, Springs
  - Wedges
  - Swaging
  - Checking for fracturing
  - Deformation
  - Remedial action
- d) Inspection of sheaves encompassing:
  - Groove condition
  - Riffling
  - Ropes down in sheaves
  - Maintenance records

### **2.6.42 Escalators, moving walk and tread way mechanics**

Evidence shall show an understanding of escalators, moving walk and tread way mechanics to an extent indicated by the following aspects:

- a) Escalators encompassing:
  - Statutory and enterprise requirements: Lift Code, OHS, Emergency stop, Danger signage, Barriers and Running clearances
  - Purpose of Controller, Safety devices, Chain/steps and Hand rail
  - Techniques for repair of Steps/belts/pallets, Combs, Guards, Balustrades, Newel rollers, Balustrade lighting and hand rails
  - Adjustments of Chains, Hand rail, Brake, Steps and Safety devices

b) Safe working procedures encompassing:

- Removing steps/pallets,
- Working in motor room/pit,
- Cleaning/lubricating,
- Guards
- Hand rails remove/refit

c) Installation and commissioning encompassing:

- Aligning,
- Testing,
- Handling
- Running clearances

d) Escalator types to suit applications

Note.

Factors include volume of people, Gradient and Multi floor use

e) Moving walks encompassing:

- Types; Continuous belts and palletised types
- Statutory requirements: OHS, Lift Code
- Comparison with escalator

f) Tread Ways encompassing:

- Belt and palletised types
- Statutory requirements, OHS, Lift Code

### 2.6.43 Lift systems, plumbing and setting out

Evidence shall show an understanding of plumbing and setting out to an extent indicated by the following aspects:

a) Single lift wells encompassing:

- Purpose
- Need for accuracy
- Modification of errors
- Use of template
- Use of plumb lines and weights
- Measuring and marking out lift wells
- Measuring and marking out machine room (where appropriate)
- Plumbing chart
- Identification of clearances
- Adjustment of templates
- Use of laser level

b) Multiple lift wells encompassing:

- Use of centre line/datum
- Use of survey information and layouts
- Setting of well templates
- Plumb charts analysis for three dimensional impact
- Corrective action

- Use of theodolite
- c) Fixing devices and methods encompassing:
- Inserts
  - Expansion anchors
  - Chemically bonded anchors

#### **2.6.44 Lift equipment alignment techniques**

Evidence shall show an understanding of lift components – electrical/electronics to an extent indicated by the following aspects:

- a) Equipment layout encompassing:
- Specifications
  - Clearances
  - 3D impact on layout
  - Lift code
- b) Alignment equipment encompassing:
- Gauges
  - Straight edges
  - Rail gauges
  - Shims/packers
  - Lasers
- c) Machine room alignment encompassing:
- Machine and fixings
  - Diverter sheave
  - Governor and tensioning sheaves
  - Counterweight centre lines
  - Sheave and roping system
- d) Lift car alignment encompassing:
- Superstructure
  - Frames
  - Doors
- e) Lift well alignment encompassing:
- Guides and brackets
  - Trimmer beams
  - Buffers
  - Landing doors and locks
  - Compensators
- f) Running clearances encompassing:
- Safety gear
  - Car sill
  - Door operator
- g) Car operating devices encompassing:
- Slowdown switch

- Limits
  - Inductors
  - Door locks
  - Vanes and Shaft information
- h) Installation and aligning hydraulic equipment procedure encompassing:
- Ram/Cylinder
  - Hydraulic Lines
  - Bleeding Hydraulic system

#### 2.6.45 Lift components – electrical/electronics

Evidence shall show an understanding of lift components – electrical/electronics to an extent indicated by the following aspects:

- a) Traction lifts encompassing:
- Lift control circuits (relay logic only): floor selector circuitry,
  - Machine room control (selector) and well control (transducer) circuitry
- Note:  
Examples are: direction slowing and stopping, re-leveling, door operator, acceleration, button, indicator/lantern, lights and emergency lights, traveling cables, key switch circuits, fans, main supply and power circuits
- b) Safety circuits encompassing:
- Type, operation and actuation
- Note  
Examples are: landing door locks, car door locks, emergency stop, pit switch, car trap-door switch, fire service, car top switch, tappet switch, governor switch, safety gear switch, reverse phase relay, phrase failure relay and limit switches.
- c) Maintenance, replacement and adjustment encompassing:
- Electrical and electronic lift components
- Note:  
Examples are: traveling cables, tachometers, selectors, encoders and transducers.
- Safety devices:
- Note:  
Examples are: overloads, circuit breakers, limit switches, terminal stopping, door protection, governors and safety gear/switches.
- d) Electrical layout/drawings and special requirements encompassing:
- Lift code & AS/NZS 3000 requirements
  - specific lift symbols
  - conduits
  - trailing cable
  - troughing
  - colour coding and labeling
  - segregation LV/ELV
  - telephone and communication cabling
  - regulatory requirements and door lock wiring.
- e) Safety drive adjustment encompassing:
- Emergency stop button

- speed governor
- reverse phase protection
- broken chain/step switch
- broken main drive switch
- drive access switch
- start pressure switch and landing guards/barriers.

f) Lift components – electronic encompassing:

- Encoders
- Transducers
- Electronic boards
- Selectors
- Rectifiers
- Capacitors
- Resistors
- Processor Board
- I/O board

g) Drives - types, construction and operation encompassing:

- Traction
- Gearless types

Note:

Examples are: Speed/load characteristics, Efficiency, Application, Brakes, Electric prime mover (motor types and control)

- Geared types

Note:

Examples are: Speed/load characteristics, Efficiency, Application, Brakes, Electric prime mover (motor types and control)

- Other types of lifts

Note:

Examples are: Drum, Rack and pinion, Chain, Screw

h) Fault finding encompassing:

- Visual inspection
- Performance checks and application of fault finding
- Principles

#### **2.6.46 Lift systems – basic operations**

Evidence shall show an understanding of lift systems – basic operations to an extent indicated by the following aspects:

a) Safety issues encompassing:

- Personal safety equipment
- Hazard identification and reporting
- Single and team manual handling
- Communication on site
- Emergency procedures

b) Access to and safe working practice encompassing:

- Machine room
  - Top of car
  - Lift pit
- c) Statutory requirements encompassing:
- Lift Code
  - Australian Standards
- d) Escalators and moving walks encompassing:
- Components
- Note:  
Examples are: Machine Brakes, Controllers, Safety devices, Balustrade lighting, Steps/pallets/belts, Hand rail, Drive chain, Truss, Track systems, Step/pallet chains, Rollers, Tension carriage, Hand rail earthing
- e) Traction lift components
- f) Types of lifts encompassing:
- Passenger
  - Goods
  - Service
- g) Machine room equipment encompassing:
- Machine
  - Controller
  - Governor
  - Floor selector
- h) Well equipment encompassing:
- Guide rails
  - Landing doors and locks
  - Limit switches/operating devices
  - Ropes
  - Roping systems
  - Counterweights
- i) Pit equipment encompassing:
- Buffers
  - Compensators
  - Safety equipment
- j) Car equipment encompassing:
- Frame
  - Superstructure
  - Door operator
  - Travelling cable
  - Buttons and indicators
  - Communication devices
  - Safety gear

#### **2.6.47 Lift components - electro-mechanical**

Evidence shall show an understanding of electro-mechanical lift components to an extent indicated by the following aspects:

a) Lift control circuits using relay logic encompassing:

- Button circuit
- Indicator/lantern circuit
- Key switch circuits
- Fans
- Mains supply
- Power circuits
- Floor selector circuitry
- Motor room control (selector)
- Well control (transducer)
- Directional circuitry
- Slowing and stopping circuitry
- Re-levelling circuitry
- Door operator circuitry
- Acceleration circuits

b) Safety circuits - type, operation and actuation encompassing:

- Landing door locks
- Car door locks
- Emergency stop
- Pit switch
- Car trap-door limit switch
- Fire service
- Car top switch
- Tappet switch
- Governor/switch
- Safety gear switch
- Reverse phase relay
- Phase failure relay
- Overloads
- Circuit breakers
- Limit switches
- Terminal stopping
- Door protection
- Circuit switches

c) Lift components – electronic encompassing:

- Encoders
- Transducers
- Electronic boards
- Selectors
- Rectifiers

- Capacitors
  - Resistors
  - Processor board
  - I/O board
- d) Lift components – electrical encompassing:
- Relays
  - Tachos
  - Limit switches
  - Brushes
  - Selectors
  - Motor/generator
  - Transformers
  - Fuses
  - Lamps
  - Terminals
- e) Electrical layout and special requirements encompassing:
- Lift Code and AS 3000 requirements
  - Special lift symbols
  - Conduits
  - Travelling cable
  - Troughing
  - Colour coding and labelling
  - Segregation LV/ELV
  - Communication cabling
  - Door lock wiring
- f) Drives encompassing:
- Types
  - Construction
  - Operation
- g) Traction encompassing:
- Speed/load characteristics
  - Efficiency
  - Application
  - Brakes
  - Electric prime mover (motor types and control)
- h) Geared types encompassing:
- Speed/load characteristics
  - Efficiency
  - Application
  - Brakes
  - Electric prime mover (motor types and control)
  - Drum
- Note:

Examples are: Rack and pinion, chain

## 2.6.48 Electric lifts - mechanics

Evidence shall show an understanding of the mechanics of electrical lifts to an extent indicated by the following aspects:

a) Governors encompassing:

- Types

Note:

Examples are: Vertical shaft, Overspeed devices, Horizontal shaft

- Operation

Note:

Examples are: Testing procedures for each type of governor, Governor rope tension test

b) Safety gear encompassing:

- Types

Note:

Examples are: Type A instantaneous, Type B flexible guide clamp, Type C wedge clamp, Type D oil buffer

c) Release procedures for each type of safety gear/governor combination

d) Statutory requirements

e) Maintenance, replacement and adjustment of mechanical lift components encompassing:

- Door locks
- Air cords
- Selectors
- Bearings

Note:

Examples are: Roller, Sleeve, Guide shoes, Roller, Slipper

- Door guides
- Landing doors
- Car doors
- Tapes/chains
- Motor room equipment
- Well equipment
- Pit equipment

f) Brakes encompassing:

- Geared machine brakes
- Gearless machine brakes

g) Brake function and statutory requirements

h) Types of brake operation encompassing:

- Mechanical configurations

Note:

Examples are: External, Internal

- Electrical operations

Note:

Examples are: Stall motor, Solenoid, Hydraulic

i) Brake inspection and adjustment encompassing:

- Mechanical
  - Electrical
- j) Brake circuit operation encompassing:
- Brake circuitry
- k) Manual release of brakes encompassing:
- Safe procedures
  - Release devices
- l) Statutory requirements

#### **2.6.49 Electro-hydraulic lifts**

Evidence shall show an understanding of electro-hydraulic lifts to an extent indicated by the following aspect:

- a) Electrical circuitry
- b) Pump motor, starter
- c) Control components and operation encompassing:
- Governor switch
  - Over travel limits
  - Up, down solenoids
  - Up, down limit switches
  - Levelling switch
  - Stop button
  - Faulty components diagnosis
- d) Hydraulic components
- e) Hydraulic circuitry
- f) Servicing

#### **2.6.50 Electro-hydraulic lifts - mechanical operation**

Evidence shall show an understanding of the mechanical operation of electro-hydraulic lifts to an extent indicated by the following aspect:

- a) Principles of fluid power encompassing:
- Fluids
  - Hydraulics
  - Pascal's Law
  - Safety considerations of fluids under pressure
- b) Components encompassing:
- Pump
  - Control of hydraulic pressure
  - Solenoid valves
  - Directional flow
- Note:  
Examples are: Pressure gauge
- Ram/cylinders
- Note

Examples are: Single stage, Multi stage

- Oil cooler
  - Oil reservoir
  - Filters
  - Seals
  - Bleeding lines
- c) General operation
- d) Lift applications
- e) Types of arrangements encompassing:
- Side acting
  - Direct
  - Suspended
- f) Requirements of Lift Code/Standards encompassing:
- Viewing communication windows
  - Labelling circuit breakers'
  - Head room/top of car
  - Pump installation under car
  - Anti-creep devices
  - Closing of landing doors
- g) Emergency passenger release encompassing:
- Manual lowering
  - OHS considerations
  - communications

### **2.6.51 Emergency release procedures - trapped passengers**

Evidence shall show an understanding of emergency release procedures for trapped passengers to an extent indicated by the following aspect:

- a) OHS considerations encompassing:
- Enterprise requirements and procedures
  - Passenger safety
  - Moving under power
  - Hand winding
- b) Communication with passengers related to status of lift encompassing:
- Determining numbers and condition of passengers
  - Direction of lift travel before stopping
  - Fault indication
  - Status of doors
- c) Communication with passengers related to passenger safety and comfort encompassing:
- Warnings about using controls
  - Warnings about standing near doors
  - Information related to impending movement
  - Information relating to opening of doors
  - Reassurance as to safety of passengers

- Emergency medical support

## 2.7 Electrical installations and systems

### 2.7.1.1 Electrotechnology, building systems and materials

Evidence shall show an understanding of building systems and materials to an extent indicated by the following aspects:

- a) Methods, components and materials
- b) Process and sequence
- c) Cables and equipment in buildings

### 2.7.1.2 Electrical installations, wiring and accessories

Evidence shall show an understanding of the installation of wiring and accessories to an extent indicated by the following aspects:

- a) Standards, codes and requirements applicable to installing wiring and accessories.
- b) Techniques for installing wiring and accessories encompassing:
  - Application of accessories
  - Drawing-in and placing cables
  - Terminating cables and conductors
  - Maintenance of fire rating integrity.

### 2.7.1.3 Electrical wiring systems

Evidence shall show an understanding of electrical low voltage wiring systems to an extent indicated by the following aspects:

- a) TPI and TPS encompassing:
  - regulatory requirements for the installation of flat and circular TPS cables.
  - installation methods used for exposed circular TPS cable of a final subcircuit for lighting or a socket outlet or an appliance.
  - testing of the final subcircuit to ensure it complies with requirements and is safe to connect to the supply.
- b) Enclosures encompassing:
  - regulatory requirement for the installation of cable enclosures such as metallic and non-metallic conduit and trunking.
  - installation methods used for TPI cable enclosed in conduit and trunking, of a final subcircuit for lighting or a socket outlet or an appliance.
  - testing of the final subcircuit to ensure it complies with requirements and is safe to connect to the supply.
- c) Fire related cables encompassing:
  - regulatory requirements for the installation of fire related cable.
  - installation methods used for fire related cable, of a final subcircuit for lighting or a socket outlet or an appliance.
  - testing of the final subcircuit to ensure it complies with requirements and is safe to connect to the supply.
- d) Armoured cable encompassing:
  - regulatory requirements in relation to the installation of armoured cable.

- installation methods used for armoured cable of a final subcircuit for a socket outlet or appliance.
  - testing of the final subcircuit to ensure it complies with requirements and is safe to connect to the supply.
- e) Catenary supported cables and pendants encompassing:
- regulatory requirements for the installation of catenary supported cables and pendant-type socket outlets.
  - installation methods used for catenary support cable system of a final subcircuit for a socket outlet or a tracking cable for an appliance.
  - testing of the final subcircuit to ensure it complies with requirements and is safe to connect to the supply.
- f) Aerial conductors encompassing:
- pole/post/strut selection
  - conductor selection and spacing
  - clearance requirements and safety measures
- g) Underground wiring encompassing:
- categories, cables and enclosures
  - depth laying, protection and other safety measures.

### **2.7.2 Electrical installations, equipment requirements**

Evidence shall show an understanding of the installation of electrical equipment to an extent indicated by the following aspects:

- a) Standards, codes and requirements applicable to installing electrical equipment.

Note:

Equipment includes switchgear and controlgear, motor starters and control devices, measuring and monitoring devices, luminaires and associated controls, heating controls and the like.

- b) Typical locations for various equipment

- c) Terminal configuration for connection of phase, neutral and protective earthing conductors for each type of equipment

### **2.7.3 Electrical installations, safety principles and requirements**

Evidence shall show an understanding of electrical protection for safety to an extent indicated by the following aspects:

- a) Safety principle to which electrical systems in building and premises shall comply

- b) Compliant methods for providing protection.

Note:

Methods include those for providing protection against direct and indirect contact; thermal effects; unwanted voltages; overcurrent; fault currents; overload; overvoltage; injury from mechanical movement

- c) Requirements for installation design and selection of equipment.

Note:

1. Installation design includes compliant protection arrangements; correct functioning; compatibility with supply; estimation of maximum demands; voltage drop considerations; arrangement of circuits and the like

### 2.7.4.1 Electrical installations, protection methods and devices

Evidence shall show an understanding of electrical installations protection methods and devices to an extent indicated by the following aspects:

- a) Electrical installation safety encompassing:
  - effects on the human body of various levels of a.c. and d.c. current and duration of current flow for various current paths.
  - risk of ignition of flammable materials due the thermal effects of current or electric arcs in normal service of an electrical installation.
  - risk of injury from mechanical movement of electrically actuated equipment.
- b) Protection against indirect contact encompassing:
  - indirect contact with live parts of an electrical installation may occur.
  - methods and devices that comply with the Wiring Rules for providing protection against indirect contact.
  - components of the 'automatic disconnection of supply' method of protection against indirect contact.
  - the terms 'touch voltage' and 'touch current'.
  - the current path when a short circuit fault to exposed conductive parts of an appliance occurs.
  - protection against indirect contact is by the use of Class II equipment and by electrical separation.
- c) Earthing encompassing:
  - the terms: earthed, earthed situation, equipotential bonding, multiple earthed neutral (MEN) system, main earthing conductor, protective earthing conductor, functional earthing.
  - minimum size-earthing conductor for a range of active conductor sizes and materials.
  - parts of an earthing system and explain the purpose of each.
  - typical arrangement for a MEN earthing system.
  - arrangements of protective earthing conductors that comply with the Wiring Rules.
  - requirements for earthing in a range of installation situations.
  - requirements for equipotential bonding in a range of installation situations.
- d) Protection against overload and short circuit current encompassing:
  - overload current or fault currents in an electrical installation.
  - equivalent circuit of a fault loop identifying each impedance component and the electrical supply source.
  - level of fault current possible at a given point in an installation from the fault-loop impedance and data from the electricity supplier.
  - methods and devices that comply with the Wiring Rules for providing protection against the damaging effects of overload and fault current
- e) Devices for automatic disconnection of supply encompassing:
  - operating principles of thermal/magnet circuit breakers.
  - operating principles of common types of fuses.
  - operating principles of residual current devices (RCD).
  - time/current curves tripping characteristics of various types of circuit breakers that comply with the requirements of the Wiring Rules.

- time/current curves fusing characteristics of various types of fuses that comply with the requirements of the Wiring Rules.
  - time/current curves tripping characteristics of various types of RCDs that comply with the requirements of the Wiring Rules.
  - factors in a fault loop that will effect the impedance of the circuit.
  - maximum impedance of a fault loop to ensure operating of a protection device in compliance with the performance requirements of the Wiring Rules.
- f) Protection against over voltage and under voltage encompassing:
- causes of over voltage and how this may effect the electrical system.
  - methods for protection against over voltage.
  - causes of under voltage and how this may effect the electrical system.
  - methods for protection against under voltage.

#### 2.7.4.2 Electrical installations, circuit arrangements and cable selection

Evidence shall show an understanding of electrical installations design and equipment selection techniques to an extent indicated by the following aspects:

- a) Performance requirements – design consideration encompassing:
- harmful effect against which the design of an electrical installation must provide protection.
  - acceptable performance standards of a correctly functioning electrical installation.
  - supply characteristics that shall be determined when designing an electrical installation
  - acceptable methods for determining the maximum demand in consumers mains and submains
  - the Wiring Rules’ requirements limiting voltage drop in an installation.
  - reason for dividing electrical installations into circuits and the factors that shall determine their number and type.
  - typical external factors that may damage an electrical installation and that shall be considered in the installations design.
- b) Circuit arrangements encompassing:
- factors that shall be considered in determining the number and type of circuits required for an installation.
  - daily and seasonal demand for lighting power, heating and other loads in a given installation.
  - number and types of circuits required for a particular installation.
  - a layout/schedule of circuits for given installations.
- c) Factors affecting the suitability of wiring systems encompassing:
- wiring systems typically used with various construction methods and particular environment.
  - installation conditions that may affect the current-carrying capacity of cables.
  - external influences that may affect the current-carrying capacity and/or may cause damage to the wiring system.
  - the Wiring Rules’ requirements for selecting wiring systems for a range of circuits, installation conditions and construction methods into which the wiring system is to be installed.

Note:

Wiring systems include cable enclosures, Underground wiring, Aerial wiring, Catenary support, Emergency systems, Busbar Trunking and Earth Sheath Return.

d) Selecting cables encompassing:

- maximum demand for the consumers main and submains for given installations up to 400 A per phase.
- current requirements for given final subcircuits.
- cable selection standards use to select conductor size based on the maximum current requirement while not exceeding voltage drop limitations or maximum fault loop impedance for a given circuit.

### **2.7.4.3 Electrical installations, advanced methods of cable and protection selection**

Evidence shall show an understanding of advanced methods of cable and protection selection to an extent indicated by the following aspects:

a) Faults currents and protection encompassing:

- Methods of determining prospective fault current

Note.

Examples include measurement and calculation

- Protection requirements and methods
- Effects of voltage drop

b) Selection of cables encompassing:

- Short circuit performance limitations
- Effects of voltage drop

### **2.7.5.1 Electrical installations, testing and verification**

Evidence shall show an understanding of electrical installations testing and verification to an extent indicated by the following aspects:

a) Legislated regulations encompassing:

- legislation and regulations that require installations and equipment to be tested to ensure they are safe.
- the person/bodies responsible for the various aspects of ensuring electrical installations are safe.
- results of tests that show an electrical installation is safe for connection to the supply.
- results of periodic inspection and tests that show construction site wiring and equipment is safe to use.
- results of periodic inspection and tests that show electrical equipment is safe to use.

b) Testing installations encompassing:

- tests to ensure: insulation resistance is adequate; earth continuity is such that it will ensure the operation of protection devices under earth fault conditions; polarity of active/s and neutral for mains, submains and final subcircuits is correct; there is no transposition of earthing and neutral conductors; fault-loop impedance is sufficiently low; RCD for correct operation and sensitivity.
- functional tests to ensure active/s and neutral for the same circuit are clearly identified with their circuit protection device.

- tests that show all circuits and devices operate as intended.
  - tests to determine the fault level at a particular point in an installation.
- c) Documentation encompassing:
- results of tests conducted on an installation comply with requirements and ensure the installation is safe.
  - documents of the results of testing an installation as required by the local supply authority.
  - documents of periodic inspection and testing of construction site wiring and equipment in accordance with requirement.
  - documents of periodic testing and inspection of electrical equipment including tagging requirements.

### **2.7.5.2 Electrical installations, testing and verification of special installations**

Evidence shall show an understanding of testing and verification to an extent indicated by the following aspects:

- a) Mandatory and optional testing and verification requirements applicable to special installations.

Note.

Special installations include those for caravan parks, construction and demolition sites, marinas, medical treatment areas and moveable premises and HV installation in consumer's premises

- b) Testing techniques  
 c) Features of special installations that can be visually inspected

### **2.7.5.3 Fire protection installations, testing and verification methods**

Evidence shall show an understanding of methods for testing and verifying compliance and functionality of fire protection installation to an extent indicated by the following aspects:

- a) Mandatory and optional testing and verification requirements applicable to fire protection installations.  
 b) Testing techniques  
 c) Features of fire protection installations that can be visually inspected

### **2.7.6 Electrical installations, emergency systems**

Evidence shall show an understanding of electrical requirements for emergency systems to an extent indicated by the following aspects:

- a) Principles and practices of electrical emergency systems for electrical installations

Note:

Includes the use of relevant Australian Standards, Australian building code, and associated hazards

- b) Arrangement and requirements for fire and smoke control equipment  
 c) Arrangement and requirements for emergency warning and intercommunications systems  
 d) Arrangement and requirements for emergency evacuation lighting  
 e) Arrangement and requirement for emergency power supplies

### **2.7.7 Electrical installations, special installation requirements**

Evidence shall show an understanding of requirements for electrical installations in for

marinas, moveable premises and caravan parks, medical treatment centres and construction and demolition sites to an extent indicated by the following aspects:

- a) Requirements for installation of wiring and equipment
- b) Compliant methods for providing protection
- c) Requirements for installation design and selection of equipment
- d) Mandatory testing and verification requirements

### **2.7.8 Electrical installations, hazardous areas**

Evidence shall show an understanding of requirements for electrical installations in hazardous areas to an extent indicated by the following aspects:

- a) Standards and requirements applicable to hazardous encompassing:

Note:

- 1. Standards may be Australian/ New Zealand or IEC as applicable to a workplace in which competency is demonstrated.
- 2. Requirements include wiring and equipment permitted and not permitted and installation standards applicable to a particular explosion-protection techniques.

- b) Hazardous area verification dossier and its purpose.
- c) Mandatory installation documentation required as a record of the installation process, including certification documentation.

Note:

Documentation includes zone designation drawings, equipment certification and as-installed drawing and installation modification approvals.

### **2.7.9.1 Electrical installations, single phase inspections**

Evidence shall show an understanding of basic electrical inspection processes to an extent indicated by the following aspects:

- a) Scope of inspection of single phase installations.
- b) Processes for inspection of single supply arrangements, main switchboard and earthing
- c) Actions and procedures for dealing with non-compliance defects.

### **2.7.9.2 Electrical installations, inspections and safety compliance audits**

Evidence shall show an understanding of electrical inspection processes to an extent indicated by the following aspects:

- a) Inspection types and their scope.

Note:

Examples include inspection of general electrical installations, special electrical installations, hazardous areas installations, safety audits and investigations.

- b) Inspection procedures
- c) Processes for confirming that performance standards have been met.
- d) Actions and procedures for dealing with non-compliance defects.

### **2.7.10 Electrical installations, determination of demand**

Evidence shall show an understanding of method for determining the demand in mains, submains and final subcircuits to an extent indicated by the following aspects:

- a) Acceptable methods for determining demand in mains and submains

b) Applying calculation and assessment methods of determining demand in mains and submains.

#### **2.7.11 Electrical installations, overcurrent protection**

Evidence shall show an understanding of current protection to an extent indicated by the following aspects:

- a) Application of acceptable methods for determining prospective fault current.
- b) Relationship between prospective fault current and characteristics of protective devices.
- c) Relationship between overcurrent protection at various points in an electrical distribution system.

#### **2.7.12 Electrical installations, overvoltage and undervoltage protection**

Evidence shall show an understanding of overvoltage and undervoltage to an extent indicated by the following aspects:

- a) Application of acceptable methods for determining the need for overvoltage and undervoltage protection
- b) Methods and devices providing overvoltage and undervoltage protection

#### **2.7.13 Electrical installations, programmable logic controller requirements**

Evidence shall show an understanding of requirements for the installation of programmable logic controller to an extent indicated by the following aspects:

- a) Performance for safety requirements and regulations encompassing:
  - Protection against mechanical movement
  - environmental limitations/protection

Note.  
Safety requirements are describe in Australia/New Zealand Standard (e.g. AS/NZS 3000:2000) and adopted IEC Standards.
- b) Regulations and manufacturer's installation requirements encompassing:
  - physical positioning of CPU and I/O racks
  - routing signal/power cables
  - signal/power earthing requirements
- c) Selection of related control equipment and devices

#### **2.7.14 Procedures and processes for responding to reported electrical incidents**

Evidence shall show an understanding of procedures and processes for responding to reported electrical incidents to an extent indicated by the following aspects:

- a) Reporting requirements of the electricity legislation for electrical accidents on customer's premises.
- b) Responsible for investigating electrical accidents on customer's premises.
- c) Reporting procedures of electrical accidents on consumer's premises and distributor's assets.
- d) Actions to be taken when an electrical incident causes loss of life, personal injury or property damage.
- e) Initial task of an investigator of an electrical incident.

f) Extent of evidence needed to be gathered from the site of an electrical incident.

### **2.7.15 Causes and consequence of unsafe and misuse of electrical installations and equipment.**

Evidence shall show an understanding of causes and consequence of unsafe and misuse of electrical installations and equipment to an extent indicated by the following aspects:

a) Conditions and actions that could result in death, injury of property damage from an electrical cause encompassing:

- Non-compliance defects of an electrical installation.

Note.

Compliance cover requirements set by regulations and is typical those specified by the of the Wiring Rules, Service Rules and Building Code.

- Connection or use of unsuitable (not approved) electrical equipment and appliances.
  - Failure to follow safe working procedures.
  - Deliberate misuse.
  - Unacceptable rise in potential of exposed and extraneous conductive parts.
- b) Causes of rise in potential of exposed and extraneous conductive parts encompassing:
- High impedance in the main or service neutral conductor of an MEN system.
  - Earth faults.
  - High impedance in the protective earthing under fault conditions.
  - Ineffective equipotential bonding under fault conditions.
  - Ineffective protective device under fault conditions.
- c) Effects and consequences of current through the human body.
- d) Electrical sources of fire in building and premises.

## 2.8 Electrical principles

### 2.8.1.1 Basic electrical principles

Evidence shall show an understanding of electrical principles to an extent indicated by the following aspects:

- a) Nature of electrical current and charge
- b) Sources of electricity
- c) Effects of current
- d) Single-source single-load circuits encompassing:
  - components that make up the circuit, and
  - relationship between voltage and current
- e) Consequences of a short-circuit and an open-circuit.

### 2.8.1.2 Fundamental electrical principles

Evidence shall show an understanding of electrical principles to an extent indicated by the following aspects:

- a) Fundamental and derived units encompassing:
  - basic units of measurement.
  - SI derived units for force, pressure, energy/work temperature and power.
  - conversion of units to multiple and submultiple units.
  - transposition of a given equation for any variable in the equation.
  - value of electrical and related mechanical quantities given in any combination of units, multiple units or submultiple units.
- b) Power, work and energy encompassing:
  - relationship between power, work and energy.
  - input, output, efficiency or losses of electrical systems and machines in terms of units / multiple units of power.
  - effect of losses in electrical wiring and machines.
- c) Electrical characteristics of materials encompassing:
  - characteristics of solid conductors, electrolytes, insulators and semi-conductors.
  - mechanisms of electrical conduction in solids, liquids and gases.
  - The terms “electric charge”, “electric current” and “electromotive force.”
- d) The simple circuit encompassing:
  - symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in circuit diagram.
  - purpose of each component in the circuit.
  - effects of an open-circuit, a closed-circuit and a short-circuit.
- e) Resistance encompassing:
  - relationship between voltage and current from measured values in a simple circuit.
  - Value of voltage, current and resistance in a circuit given any two of these quantities.
  - power dissipated in a circuit from voltage, current and resistance values.
  - relationship between voltage, current and resistance and the power dissipated in a circuit.

f) Effects of current encompassing:

- physiological effects of current.
- the fundamental principles (listed in AS/NZS 3000) for protection against the physiological effects of current.
- basic principles by which electric current can result in the production of heat; the production of light; the production of magnetic fields; a chemical reaction.
- typical uses of the effects of current.
- mechanisms by which metals corrode.
- The fundamental principles (listed in AS/NZS 3000) for protection against the damaging effects of current.

g) Sources of electrical energy – conversion of other forms to electrical energy encompassing:

- basic principles which electricity is produced from a chemical reaction (primary cells, secondary cells and fuel cells); produced from a magnetic field coupled with motion; produced from light; produced from heat; produced from force.
- single emf source equivalent circuit.

h) Using measuring instruments encompassing:

- safe working procedures when working with instruments.
- handling and storage of instruments to ensure they are protected from damaged.
- selection of an instrument to measure voltage, current or resistance.
- connection of instruments into a circuit to measure voltage, current and resistance
- reading analogue scales and digital readouts in measuring voltage, current and resistance.

### 2.8.1.3 Electrotechnical principles

Evidence shall show an understanding of electrotechnical principles to an extent indicated by the following aspects:

a) Resistance encompassing:

- relationship between voltage, current and resistance and the power dissipated in a circuit
- value of voltage, current and resistance in a circuit given any two of these quantities
- the factors of length, cross-sectional area and material effect the resistance of conductors
- effects of temperature change on the resistance of various conducting materials
- features of fixed and variable resistor types and typical applications
- characteristics of temperature, voltage and light dependent resistors and typical applications of each

b) Series circuits encompassing:

- measurement of resistance, voltage and current values in a single source series circuit
- the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
- relationship between the voltage drops around a circuit and the applied voltage

c) Parallel circuits encompassing:

- measurement of resistance, voltage and current values in a single-source parallel circuit
  - the voltage, current, resistance or power dissipated from measured or given values of any of these quantities
  - relationship between currents entering a junction and currents leaving a junction
- d) Series/parallel circuits encompassing:
- measurement of resistance, voltage and current values in a single-source series / parallel circuit
  - the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
- e) Measurement of electrical quantities encompassing:
- operating characteristics of analogue and digital meters
  - selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application
- f) Capacitance/Capacitors encompassing:
- definition of capacitance and explain how a capacitor is charged
  - the units by which capacitance is measured
  - relationship between capacitance, voltage and charge
  - behaviour of a series d.c. circuit containing resistance and capacitance components
  - factors which determine the capacitance of a capacitor and explain how these factors are present in all circuits to some extent
- g) Magnetism and electromagnetism encompassing:
- field patterns around given permanent magnets
  - magnetic field patterns around a straight current carrying conductor and a solenoid
  - direction in which the magnetic field around a straight current carrying conductor
- h) Electromagnetic induction encompassing:
- factors required to induce an emf in a conductor
- i) Sinusoidal alternating voltage and current encompassing:
- how a sinusoidal voltage is generated in a single turn coil rotated in a uniform magnetic field
  - definition of the terms ‘period’, ‘maximum value’, ‘peak-to-peak value’, ‘instantaneous value’, ‘average value’ and ‘root-mean-square (r.m.s.) value’ in relation to a sinusoidal waveform
  - instantaneous value of induced voltage of a generated sinusoidal waveform
  - root-mean-square (r.m.s.) value and frequency of a sinusoidal waveform from values of peak voltage and period
- j) Test equipment encompassing:
- operating principles of a CRO including block diagram of functional areas
  - set up, calibration and use of an oscilloscope to measure d.c and a.c. voltages and frequency
  - measurement of the instantaneous, peak, peak-to-peak values and the period of sinusoidal and other common waveforms provided by a signal generator
  - calibration and limitation of CRO probes
  - use of signal generator as a voltage source
- k) Phase relationships in a.c. circuits encompassing:
- phasor representation of graphical waveforms

- ‘in-phase’, ‘out-of-phase’, ‘phase angle’, ‘lead’, and ‘lag’
  - convention for representing voltage, current and the reference quantity in a phasor diagram
  - phasor diagrams to show the relationship between two or more a.c. values of voltage and/or current
- l) Single-source resistive a.c. circuits of various frequencies encompassing:
- single-source a.c. circuit and taking resistance, voltage and current measurements
  - voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
- m) Inductance in a.c. circuits encompassing:
- concept of inductance, self-inductance and mutual inductance. (in terms of storage of magnetic energy)
  - factors affecting inductance and how the unit of inductance is derived
  - value of induced voltage in a given circuit
  - how a series d.c. circuit containing resistance and inductance behaves
  - ‘inductive reactance’
  - inductive reactance of a given inductor and show the relationship between inductive reactance and frequency
  - applying Ohm’s law to determine voltage, current or inductive reactance in a purely inductive a.c. circuit given any two of these quantities
  - examples of inductive components in circuits and systems and describe their effect on the phase relationship between voltage and current
- n) Capacitance in a.c. circuits encompassing:
- capacitive reactance of a given capacitor and the relationship between capacitive reactance and frequency
  - applying Ohm’s law to determine voltage, current or capacitive reactance in a purely capacitive a.c. circuit given any two of these quantities
  - examples of capacitive components in electronic circuits and systems and describe their effect on the phase relationship between voltage and current
- p) Impedance in a.c. circuits encompassing:
- definition of ‘impedance’
  - impedance of series, parallel and series-parallel circuits and draw diagrams showing the relationship between resistive, inductive and capacitive components
  - single-source a.c. circuit with resistance, voltage and current measurements
  - determination of the voltage, current or impedance from measured or given values of any two of these quantities
  - using phasor diagrams to solve problems and show the relationship between voltages and currents in a.c. circuits

### 2.8.2.1 Direct current circuit principles

Evidence shall show an understanding of electrical principles to an extent indicated by the following aspects:

a) Factors affecting resistance encompassing:

- The factors of length, cross-sectional area and material effect the resistance of conductors.

- effects of temperature change on the resistance of various conducting materials.
  - the resistance of a conductor from factors such as conductor length, cross-sectional area, resistivity and changes in temperature.
  - effects of resistance on the current-carrying capacity and voltage drop in cables.
- b) Resistors encompassing:
- features of fixed and variable resistor types and typical applications.
  - characteristics of temperature, voltage and light dependent resistors and typical applications of each.
  - specifying a resistor for a particular application.
  - resistance of a colour coded resistor from colour code table and confirm the value by measurement.
- c) Series circuits encompassing:
- setting up and connecting a single-source series dc circuit.
  - Measurement of resistance, voltage and current values in a single source series circuit.
  - the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities.
  - relationship between the voltage drops around a circuit and the applied voltage.
  - relationship between voltage drops and resistance in a simple voltage divider network.
  - output voltage and current levels of connecting cells in series.
- d) Parallel circuits encompassing:
- setting up and connecting a single-source parallel circuit.
  - Measurement of resistance, voltage and current values in a single-source parallel circuit.
  - the voltage, current, resistance or power dissipated from measured or given values of any of these quantities.
  - relationship between currents entering a junction and currents leaving a junction.
  - relationship between branch currents and resistances in a two branch current divider network.
  - voltage and current levels of connecting cells in parallel.
- e) Series/parallel circuits encompassing:
- setting up and connecting a single-source series / parallel circuit.
  - Measurement of resistance, voltage and current values in a single-source series / parallel circuit.
  - the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities.
  - relationship between voltages, currents and resistances in a bridge network.
  - voltage and current levels of connecting cells in series parallel.
- f) Measurement of electrical quantities encompassing:
- hazards involved in using electrical instruments and the safety control measures that should be taken.
  - operating characteristics of analogue and digital meters.
  - selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application.
  - measuring resistance using direct, volt-ammeter and bridge methods.
  - instruments used in the field to measure voltage, current, resistance and insulation

resistance and the typical circumstances in which they are used.

g) Capacitance encompassing:

- definition of capacitance and explain how a capacitor is charged.
- the units by which capacitance is measured.
- relationship between capacitance, voltage and charge.
- Behaviour of a series d.c. circuit containing resistance and capacitance components.

h) Capacitors encompassing:

- hazards involved in working with capacitance effects and the safety control measures that should be taken.
- factors which determine the capacitance of a capacitor and explain how these factors are present in all circuits to some extent.
- effects of capacitors connected in parallel by calculating their equivalent capacitance.
- effects on the total capacitance of capacitors connected in series.
- common faults in capacitors.
- testing of capacitors to determine serviceability.

### 2.8.2.2 Alternating current principles - power

Evidence shall show an understanding of alternating currents principles used in power circuits to an extent indicated by the following aspects:

a) Sinusoidal alternating voltage and current encompassing:

- Generation of a sinusoidal voltage with a single turn coil rotated in a uniform magnetic field.
- the terms ‘period’, ‘maximum value’, ‘peak-to-peak value’, ‘instantaneous value’, ‘average value’, ‘root-mean-square (r.m.s.) value’, ‘crest factor’ and ‘form factor’ in relation to a sinusoidal waveform.
- the instantaneous value of induced voltage of a generated sinusoidal waveform.
- measurement of the instantaneous, peak, peak-to-peak values and the period of a sinusoidal waveform.
- the root-mean-square (r.m.s.) value and frequency of a sinusoidal waveform .
- phase relationship between two or more sinusoidal waveforms.

b) Phasors encompassing:

- the terms ‘in-phase’, ‘out-of-phase’, ‘phase angle’, ‘lead’, and ‘lag’.
- the phase angle between two or more alternating quantities from a given sinusoidal waveform diagram.
- convention for representing voltage, current and the reference quantity in a phasor diagram.
- phasor diagrams two or more a.c. values of voltage and/or current.

c) Resistance in a.c. circuits encompassing:

- connection of a single-source a.c. circuit to take resistance, voltage and current measurements.
- the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities.
- the relationship between voltage drops and current in a resistive a.c. circuit.

d) Inductance in a.c. circuits encompassing:

- definition of ‘inductive reactance’.

- the inductive reactance of a given inductor and show the relationship between inductive reactance and frequency.
  - equivalent inductive reactance in an a.c. circuit or any part of a circuit.
  - application of Ohm's Law to determine voltage, current or inductive reactance in a purely inductive a.c. circuit given any two of these quantities.
  - examples of inductive components in power circuits and systems and describe their effect on the phase relationship between voltage and current.
  - the comparative current limiting characteristics of inductors and resistors.
- e) Capacitance in a.c. circuits encompassing:
- definition of 'capacitive reactance'.
  - the capacitive reactance of a given capacitor and the relationship between capacitive reactance and frequency.
  - equivalent capacitive reactance in an a.c. circuit or any part of a circuit.
  - application of Ohm's Law to determine voltage, current or capacitive reactance in a purely capacitive a.c. circuit given any two of these quantities.
  - examples of capacitive components in power circuits and systems and describe their effect on the phase relationship between voltage and current.
- f) Impedance encompassing:
- definition of 'impedance'.
  - impedance of series, parallel and series-parallel circuits and diagrams showing the relationship between resistive, inductive and capacitive components (impedance triangle).
  - connection of a single-source a.c. circuit and take resistance, voltage and current measurements.
  - voltage, current or impedance values from measured or given values of any two of these quantities.
  - phasor diagram usage to solve problems and show the relationship between voltages and currents in a.c. circuits.
- g) Resonance encompassing:
- conditions in a circuit that produce resonance.
  - the relationship between resonance and frequency.
  - the effect on the current of series resonance and parallel resonance conditions.
  - applications where resonance is applied
- h) Power and power factor encompassing:
- difference between true power, apparent power and reactive power and the units.
  - definition of the term "power factor".
  - the effects of low power factor.
  - local and AS/NZS 3000 requirements regarding the power factor of an installation and power factor improvement equipment.
- i) Multiphase systems encompassing:
- features of a multiphase system.
  - voltages generated by single and multiphase alternators.
  - reasons for the adoption of three-phases for power systems.
- j) Three-phase principles encompassing:
- Generation of three-phases in a single alternator.

- r.m.s. value of voltage generated in each phase.
  - the relationship between the phase voltages generated in a three-phase alternator and the conventions for identifying each.
  - the term “phase sequence” (also, referred to as “phase rotation”).
  - determination of the phase sequence of a three-phase supply.
- k) Three-phase star-connections encompassing:
- connection of three-phase star system.
  - the phase relationship between line and phase voltages and line and phase currents of a star-connected system.
  - the r.m.s. value of line and phase voltage given any one of these quantities.
  - the r.m.s. value of line and phase current given any one of these quantities.
  - the terms “balanced load” and “unbalanced load”.
  - example of balanced and unbalanced loads in typical power systems.
- l) Three-phase four wire systems encompassing:
- purpose of the neutral conductor in a three-phase four wire systems.
  - effects of a high impedance in the neutral conductor of a three-phase four wire system supplying an unbalanced load where MEN earthing is employed.
  - the value and phase relationship of neutral current in an unbalanced three-phase four wire systems given line currents and power factors.
  - the AS/NZS 3000 requirements regarding neutral conductors.
- m) Three-phase delta-connections encompassing:
- connection of three-phase delta system.
  - phase relationship between line and phase voltages and line and phase currents of a delta-connected system.
  - the r.m.s. value of line and phase voltage given any one of these quantities.
  - the r.m.s. value of line and phase current given any one of these quantities.
  - example of delta-connection loads in typical power systems.
- n) Interconnected star and delta systems encompassing:
- relationship between line and phase voltages and line and phase currents in a system with a star-connected supply device and a delta-connected load.
  - relationship between line and phase voltages and line and phase currents in a system with a delta-connected supply device and a star-connected load.
- o) Energy and power requirements of a.c. systems encompassing:
- the purposes for measuring power, energy, power factor and maximum demand of a.c. power systems and loads.
  - methods used to measure power, energy power factor and maximum demand.
  - power factor improvement of a three-phase installation.
- p) Harmonics encompassing:
- the term “harmonic” in relation to the sinusoidal waveform of an a.c. power system.
  - sources in a.c. systems that produce harmonics.
  - problems that may arise in a.c. circuits as a result of harmonics and how these are overcome.

### 2.8.3 Power factor

Evidence shall show an understanding of power factor to an extent indicated by the following aspects:

- a) Effects of low power factor on control-gear, switchgear and circuit cables.
- b) Requirements for maintaining a high power factor.
- c) Fundamentals of methods used to improve power factor.
- d) Actions and conditions that cause lower power factor

#### **2.8.4 Three phase circuits**

Evidence shall show an understanding of three phase circuits to an extent indicated by the following aspects:

- a) Star and delta circuit configurations
- b) Relationship between line and phase voltages and between line and phase currents.
- c) Relationship between line voltage, line current and power.
- d) Balanced and unbalanced four wire systems.
- e) Consequences of high impedance in the neutral conductor where multiple-earthed-neutral (MEN) is used.

#### **2.8.5 Magnetism**

Evidence shall show an understanding of magnetism to an extent indicated by the following aspects:

- a) Concept of magnetism
- b) Magnetic field patterns and magnetic screening
- c) Applications of permanent magnets
- d) Concepts of electromagnetism
- e) Magnetic characteristics of material
- f) Magnetic field around a straight conductor and a solenoid carrying current.
- g) Factors effecting the force between adjacent current-carrying conductors, calculate the force, and state its direction.

#### **2.8.6 Electromagnetic principles**

Evidence shall show an understanding of electromagnetic principles to an extent indicated by the following aspects:

- a) Magnetism encompassing:
  - field patterns around given permanent magnets.
  - magnetic induction and its effects.
  - principles of magnetic shielding and its application.
  - Classification of magnetic materials.
  - typical applications of permanent magnets.
- b) Electromagnetism encompassing:
  - magnetic field patterns around a straight current carrying conductor and a solenoid.
  - direction in which the magnetic field around a straight current carrying conductor.
  - direction of the north pole of a solenoid.
  - factors effecting the force and direction between adjacent current-carrying conductors.

c) Magnetic quantities encompassing:

- magnetic terms and units for magnetomotive force, reluctance, magnetic flux, magnetising force and flux density.
- property of permeability and the meaning of actual and relative permeability.
- values of magnetomotive force, magnetising force, flux density, permeability and reluctance in given magnetic circuits.

d) Magnetisation curve encompassing:

- the terms “saturation”, “hysteresis” and “losses” in relation to magnetic materials and circuits.
- magnetic characteristics of various materials from magnetisation curves, permeability curves and hysteresis loops.
- magnetic losses and the resulting effects on the performance of electrical machines.

e) Electromagnetic induction encompassing:

- factors required to induce an emf in a conductor.
- Faraday’s Law.
- direction of induced voltage in a moving conductor in a magnetic field.
- relationship between the forces acting on a closed conductor when an emf is induced in it. (Lenz’s law).

f) Inductance and inductors encompassing:

- concept of inductance, self-inductance and mutual inductance. (in terms of storage of magnetic energy).
- factors affecting inductance and how the unit of inductance is derived.
- inductance of a solenoid given necessary physical data.
- value of induced voltage in a given circuit.
- growth/decay of current in an inductor and determine the time constant of a series L-R circuit.
- Types of inductors

g) Application of electromagnetic principles encompassing:

- principles of operation and applications of magnetism, electromagnetism and induction.
- hazards associated with induced voltages.
- situations where the effects of inductance and electromagnetism has an adverse effect.

h) Rotating machine construction and operating principles encompassing:

- main components of a rotating machine.
- voltage generated and back emf induced in the “armature” conductors of a machine.
- motor effect produced by an electric current, including the development of torque in a motor and opposing torque in a generator.
- induced voltage in a conductors, force on a conductor and torque of various machines.

i) Generators encompassing:

- circuit arrangement and connection of various types of generators.
- common methods of excitation used for generators.
- methods used to regulate the output voltage of generators.
- effects of load on a generator.
- applications of generators.

j) Machines encompassing:

- circuit arrangements and connections of various common motors.

- performance of motors from measured values.
  - effects of load on a motor.
- k) Specialty machines encompassing:
- tachogenerator – construction, operation and applications.
  - servomotors – construction, operation and applications.
  - stepper motors – construction, operation and applications.
  - EC motors – construction, operation and applications.

### **2.8.7 Harmonic fundamentals**

Evidence shall show an understanding of harmonics in power circuits to an extent indicated by the following aspects:

- a) Nature of harmonics and effect on a sine wave.
- b) Consequences of harmonics on cables and electrical apparatus
- c) Causes of harmonics in modern electrical systems
- d) Method of reducing harmonics

### **2.8.8 Electrotechnology science and materials**

Evidence shall show an understanding of electrotechnology science and materials to an extent indicated by the following aspects:

- a) Trade calculations encompassing:
  - mathematical techniques
  - relevant calculations
  - linear measurement, areas, volumes, ratios
- b) Engineering mechanics encompassing:
  - base physical quantities
  - concepts, principles, S.I. units, their applications in
  - engineering calculations in relation to physical quantities and
  - associated formulae
  - mass, velocity, acceleration, force, weight, density, angles
  - energy/work/power
  - moments/torque
  - centre of gravity
  - mechanical advantage
  - levers
  - pulley blocks
  - efficiency
  - friction
  - vectors
  - resolution of forces
  - forces in strung conductors
  - forces on poles and towers
  - determination of sag

- pressure/stress
- elementary fluid mechanics
- c) Engineering materials encompassing:
  - classification
  - ferrous and non-ferrous metals
  - steels, alloys,
  - properties
  - tensile strength
  - temperature and expansion in metals
  - stress and strain
  - ductility
  - applications
  - corrosion
  - galvanic corrosion
  - hardwoods and soft woods

### **2.8.9.1 Circuit analysis**

Evidence shall show an understanding of circuit analysis to an extent indicated by the following aspects:

- a) Voltage and current Laws
- b) Circuit components
- c) Types of circuits

Note:

Types include RL, RC and RLC circuits; polyphase circuits; magnetically coupled circuits and two port networks

- d) Circuit analysis techniques application and use

Note:

Techniques include Nodal and mesh analysis; superposition; Thevenin and Norton equivalents; maximum power transfer; complex frequency; Laplace transforms; and Fourier transforms;

- e) Use of software tools for analysing circuits.

### **2.8.9.2 Electrical power circuit analysis**

Evidence shall show an understanding of electrical power circuit analysis to an extent indicated by the following aspects:

- a) Superposition theorem
- b) Kirchhoff's laws
- c) Mesh analysis
- d) Thevenin's & Norton's theorems
- e) Maximum power transfer theorem
- f) Complex impedance
- g) Frequency domain
- h) Transients

### 2.8.9.3 Polyphase power circuit analysis

Evidence shall show an understanding of polyphase circuit analysis to an extent indicated by the following aspects:

- a) Complex power 1 $\phi$  and 3 $\phi$
- b) Balanced, unbalanced 3 $\phi$
- c) Impedance of 3 $\phi$  loads
- d) Measurement in 3 $\phi$  circuits
- e) Line voltage drops
- f) Neutral current
- g) Fault currents
  - symmetrical
  - asymmetrical

### 2.8.10.1 Engineering maths fundamentals

Evidence shall show an understanding of engineering maths fundamentals to an extent indicated by the following aspects:

- a) SI Units, scientific and engineering notation, significant figures and accuracy encompassing:
  - Conversion between decimal notation, scientific notation and engineering notation
- b) Evaluation of expressions using a calculator
- c) Substitution in algebraic formulas
- d) Simplification of algebraic formulas encompassing:
  - Addition of like terms
  - Removal of brackets
  - Multiplying and dividing terms
  - Algebraic fractions
- e) Applying the laws of indices
- f) Simplification of expressions involving square roots
- g) Present and interpret data encompassing:
  - building tables of values
  - building graphs
  - reading graphs
- h) Solving right-angled triangles encompassing:
- i) Pythagoras' Theorem
  - trig ratios

### 2.8.10.2 Engineering maths

Evidence shall show an understanding of engineering maths to an extent indicated by the following aspects:

- a) Transposition encompassing:
  - fractional expressions

- exponential and logarithmic expressions
  - trigonometric expressions
- b) Estimations, errors and approximations encompassing:
- Errors in measurement
  - Maximum probable error
  - Significant figures
  - Estimations and approximations
- c) Quadratic functions encompassing:
- Graphs of quadratic functions represented by parabolas and the significance of the leading coefficient.
  - Zeros represented graphically.
  - Solution of quadratic equations by factoring and the quadratic formula.
  - Solution of simultaneous linear and quadratic equations algebraically and geometrically.
- d) Exponential Functions:
- characteristics and
  - applications in engineering
- e) Logarithmic Functions :
- characteristics and
  - applications in engineering
- f) Trigonometric Functions: :
- characteristics and
  - applications in engineering
- g) Methods for solving simultaneous equations encompassing:
- determinants
  - Cramer's rule
- h) Complex numbers encompassing:
- polar to rectangular conversion
  - rectangular to polar conversion
- i) Matrices

### 2.8.10.3 Advanced engineering maths

Evidence shall show an understanding of advanced engineering maths to an extent indicated by the following aspects:

- a) Differentiation Calculus encompassing:
- Integration, integration by parts,
  - Numerical methods,
  - Partial and total differentiation.
- b) Linear Algebra encompassing:
- Matrices and inverse matrices;
  - Linear mapping,
  - Determinants,
  - Solution of linear equations.

- c) Vectors encompassing:
  - Geometrical representation,
  - Addition and scalar multiplication,
  - Dot and cross products,
  - Equations of lines and planes.
- d) Variables encompassing:
  - Graphs, level curves and surfaces
  - Partial derivatives; chain rule; directional derivative;
  - Maxima and minima.
- e) Sequences and Series encompassing:
  - Algebraic and Fourier series, convergence; Taylor's Theorem
  - Power series manipulation.
- f) Differential Equations encompassing:
  - First order and separable linear equations
  - Second order linear equations.
  - Partial differential equations.
  - Numerical Techniques.
- g) Number encompassing:
  - Integer, irrational and complex numbers.
  - Number systems.
  - Arithmetic operations.
  - Accuracy and stability.
- h) Statistics encompassing:
  - Assembly, representation and analysis of data.
  - Fitting distributions to data.
  - Non-parametric statistics.
  - Tests of significance for means, variances and extreme values.
  - Correlation

#### 2.8.10.4 Engineering mathematics with calculus

Evidence shall show an understanding of engineering mathematics with calculus to an extent indicated by the following aspect:

- a) Differential Calculus encompassing:
  - Basic concepts
    - Note.
    - Concepts shall be limited to definition of the derivative of a function as the slope of a tangent line (the gradient of a curve); limits; basic examples from 1st principles; Notation and Results of derivative of  $k.f(ax + b)$  where  $f(x)=x$  to the power of  $n$ ,  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $e$  to the power of  $x$ ,  $\ln x$ .
  - Rules
    - Note.
    - Examples are derivative of sum and difference; product rule; quotient rule; chain rule (function of a function), limited to two rules for any given function.
    - The 2nd derivative
  - Applications

Note.

Examples are equations of tangents and normals; stationary points; turning points; and curve sketching; rates of change; rectilinear motion

- Verbally formulated problems involving related rates and maxima: minima

b) Integral Calculus

- Integration as the inverse operation to differentiation

Note.

Examples are results of the integral of  $k.f(ax + b)$  where  $f(x) = x$  to the power of  $n$ ,  $\sin x$ ,  $\cos x$ ,  $\sec^2 x$ ,  $e$  to the power of  $x$

The method of substitution

The definite integral

- Applications

Note.

Examples are areas between curves; rectilinear motion including displacement from acceleration and distance travelled; voltage and current relationship in capacitors and inductors and the like

c) Differential Equations encompassing:

- First order and separable linear equations

### 2.8.11 Power engineering computations

Evidence shall show an understanding of electrical computations to an extent indicated by the following aspects:

a) Graph functions and applications encompassing:

- linear, non linear
- parabolic
- hyperbolic
- logarithmic
- exponential

b) Complex numbers encompassing:

- Polar form
- Rectangular form

c) Simultaneous equations

d) Quadratic equations

e) Phasor diagrams

f) Star-delta transformations

### 2.8.12 Electrical concepts and applications

Evidence shall show an understanding of electrical concepts to an extent indicated by the following aspects:

a) Electrical supply and distribution within a building or premises

b) Arrangement of circuits

c) Protection for safety requirements and their practice

d) Difference between alternating and direct current

e) Measurement and calculation of voltage, current, resistance and power in practical circuits.

- f) Concepts and applications of magnetism and electromagnetic induction
- g) Transformer operating principles and their application
- h) Hazards associated with electrical systems and apparatus.

### 2.8.13 Parts and component selection

Evidence shall show an understanding of electrotechnology, parts and component selection to an extent indicated by the following aspects:

a) Part and component identification encompassing:

- Type, number and ratings of a range of typical components used in the electrotechnology and engineering industries

b) Information about parts and components encompassing:

- Catalogues
- Computer access
- Alternative parts
- Telephone inquiry

Note: Examples of part identification and access may include: part codes, manufacturers and manufacturers supply outlets; availability and delivery times; price, including discounts, tax and delivery costs.

c) Ordering procedures encompassing:

- Customer approval
- Supplier requirements
- In-house requirements

d) Receiving/dispatching procedures

- Supplier requirements
- In-house requirements
- Handling and storage

#### 2.8.14.1 Electrotechnology calculations

Evidence shall show an understanding of Electrotechnology calculations to an extent indicated by the following aspects:

a) Perform basic mathematical operations including fractions, decimals, and scientific notation encompassing:

- Solve problems involving fractions.
- Express numbers as multiples and sub-multiples.
- Without the aid of a calculator estimate the result of a calculation involving mathematical operations verifying answers with a calculator.
- Estimate the result of a problem involving fractions.
- Convert fractions to decimal numbers.
- Convert decimal numbers into scientific notation.

b) Using graphs and tables show the relationship between two variables encompassing:

- Describe the different types of graphs and tables used in Electrotechnology.
- Identify dependent and independent variables.
- Derive equations from graphs and tables.

- Draw graphs involving two variables.
  - Interpret graphical presentations.
- c) Transpose a given equation for any variable in equation encompassing:
- Transpose an equation in order to calculate an unknown value.
  - Transpose an equation involving several variables
- Note:  
Examples are series/parallel resistors.
- Transpose an equation involving parentheses.
- d) Apply trigonometry to problem solving encompassing:
- Use trigonometric ratios to solve practical problems
  - Apply Pythagoras' theorem to practical problems
  - Solve problems using the sine and cosine rules
  - Determine the sine and cosine of angles up to  $720^\circ$
- e) Resolve vectors/phasors given any combination of magnitude and direction encompassing:
- Describe the use of vectors/phasors in electrotechnology situations
  - Define a vector/phasor
  - Draw a vector/phasor diagram.
  - Resolve a vector/phasor into horizontal and vertical components
  - Determine a resultant using a vector/phasor polygon.
- f) Solve electrotechnology calculations systematically encompassing:
- Analyse word problems and identify data
  - Convert relevant data to SI Unit format
  - Insert SI Unit data into relevant equations and obtain solution

#### 2.8.14.2 Electrotechnology science

Evidence shall show an understanding of Electrotechnology science to an extent indicated by the following aspects:

- a) Components
- resistors
  - fixed
- Note:  
Examples are composition and wire wound
- variable
- Note:  
Examples are rheostats, potentiometers and trimmers
- non-linear
- Note:  
Examples are thermistors, VDRs and LDRs
- capacitors
  - fixed
- Note:  
Examples are ceramic, plastic and electrolytic
- variable, trimmers

- magnetic
- transformers

Note:

Examples are AF, RF and power

- chokes
- relays
- contactors

b) Basic physics

- conductors
- definition
- common types
- typical applications
- insulators
- definition
- common types
- typical applications
- semiconductors
- definition
- common types
- typical applications
- current flow
- direction

Note:

Examples are electron/conventional

- unit
- effects of current flow
- voltage
- source

Note:

Examples are electromagnetic, chemical, heat and pressure

- unit
- resistance
- factors effecting

Note:

Examples are material, length, csa and temperature

- effect on circuit
- colour code
- preferred values
- power rating
- Ohms law
- electrical Units

Note:

Examples include sub and multiple

- volt, ampere, Ohm and Watt

- power in electrical circuits
  - $P = IV$  only
  - introductory circuit symbols
- c) Effects of electric current
- heating
  - light
  - magnetic
  - chemical
  - physiological
- d) Circuits
- series and parallel (three resistive elements max.)
  - V,I,R and P relationships
  - use lab experiments to validate theory
- e) Protection
- purpose
  - fuses
  - circuit breaking
  - safety interlocks
  - earthing – personnel safety

#### **2.8.14.3 Electrotechnology Numeracy Diagnostic Assessment Methods**

Evidence shall show an understanding of electrotechnology numeracy diagnostic assessment methods to an extent indicated by the following aspects:

a) Electrotechnology Numeracy Diagnostic Test encompassing:

- Decimals
- Fractions and Indices
- Percentages
- Graphs
- Multiples and Sub Multiples
- Ratios and Proportions
- Transposition
- Areas and Volumes
- Trigonometry and Pythagoras' Theorem
- Construction of Angles and Triangles

b) Recommendation of Remedial Action

- Action plan for remedial action
- Other support agencies
- Failure to follow action plan
- Monitoring of remedial action of learner

#### **2.8.14.4 Electrotechnology Literacy Diagnostic Assessment Methods**

Evidence shall show an understanding of electrotechnology literacy diagnostic assessment methods to an extent indicated by the following aspects:

- a) Electrotechnology Literacy Diagnostic Test encompassing:
  - Reading Comprehension
  - Spelling
  - Sentence Construction (Syntax)
  - Grammar
- b) Recommendation of Remedial Action
  - Action plan for remedial action
  - Other support agencies
  - Failure to follow action plan
- c) Communicating with suppliers and clients

### 2.8.15.1 Applied mathematical concepts

Evidence shall show an understanding of applied mathematical concepts to an extent indicated by the following aspects:

- a) Mathematical linear measurement in engineering situations encompassing:
  - Precision and error in mathematical computations and
  - Displaying mathematical outcomes in the correct format using the appropriate significant figures and in scientific notation
  - Perimeters of plane figures, polygons and the perimeter of shapes involving arcs
  - Pythagoras' theorem to engineering situations
- b) Mathematical spatial measurement in engineering situations encompassing:
  - Areas of combined shapes
  - Volume and surface areas of solids
- c) Right triangle trigonometry in engineering problem solving encompassing:
  - Problems using the six trigonometrical ratios
  - Problems involving compass bearings and angles of elevation/depression
  - Trigonometrical concepts in problems involving inclined planes, vectors and forces and electrical sinusoidal waveforms
- d) Sine and cosine rules in practical applications encompassing:
  - Sine rule to solve unknown dimensions/angles in triangles
  - Cosine rule to solve unknown dimensions/angles in triangles
- e) Mathematical concepts in basic surveying and computation of areas encompassing:
  - Mathematical concepts for radial and triangulation surveys
  - Simpson's Rule in engineering applications
- f) Basic algebra in engineering calculations encompassing:
  - Basic operations involving substitutions, additions, removal of brackets, multiplication and divisions
  - Solving linear equations
  - Transportation in non-linear equations
- g) Linear graphical techniques in engineering problem solving encompassing:
  - Graphing linear functions
  - Deriving equations from graphs and tables
  - Solving simulations equations algebraically and graphically

- The *best line of fit* graphically and determine equation
- h) Mathematical computations involving polynomials encompassing:
  - Adding, subtracting and multiplying polynomials
  - Factorising trinomials
  - Solving quadratic equation
- i) Mathematical computations involving quadratic graphs encompassing:
  - Graphs of quadratic functions
  - Maxima and minima
  - Graphical solutions of quadratic equations
  - Properties of a parabola
  - Applications of parabolas in engineering applications
- j) Trigonometry and graphical techniques in engineering outcomes encompassing:
  - Graphs of trigonometric functions eg:  $V=V_m\sin\theta, I=I_m\cos\theta$
  - Addition of equations such as:  $v\sin\theta + u\sin(\theta + \phi)$  graphically
  - Simpson's Rule to determine the average and root mean square values of a sinusoidal waveform
- k) Statistical data presentation encompassing:
  - Appropriate presentation of frequency tables, histograms, polygons, stem and leaf plots
  - Advantages of different visual presentations
- l) Appropriate sampling techniques for gathering data encompassing:
  - Design of surveys and census
  - Sample data using correct technique
- m) Use of the measures of central tendency encompassing:
  - Estimation of percentiles and deciles from cumulative frequency polygons (ogives)
  - Interpreting data from tables and graphs including interpolation and extrapolation
  - Analysing misleading graphs
- n) Measures of dispersion in statistical presentations encompassing:
  - Box-and-whisker graphs
  - Measures of dispersion using variance and standard deviation
  - Standardised scores including Z-scores
- o) Correlation and regression techniques encompassing:
  - Interpreting scatter plots
  - Correlation coefficients
  - Calculate the regression equation and use for prediction purposes
- p) Elementary probability theory encompassing:
  - Probabilities in everyday situations
  - Counting techniques: factorials; permutations; combinations
- q) Pascal's Triangle and the Normal Curve encompassing:
  - Pascal's triangle
  - Characteristics of the normal curve
  - Standard Deviation and applications to everyday occurrences
  - Probabilities using the normal curve

### 2.8.15.2 Applied physics concepts

Evidence shall show an understanding of applied physics concepts to an extent indicated by the following aspects:

a) Motion in two dimensions encompassing:

- vertical and horizontal components of velocity
- determination of the vertical component of velocity
- resolution of velocity into components
- time of flight, range, effect of air resistance
- centripetal acceleration, force causing the centripetal acceleration
- Newton's law of universal gravitation
- satellites in circular orbits
- Momentum in two dimensions

Note:

Examples are: vector form of Newton's second law of motion, Newton's second law of motion in terms of momentum, law of conservation of momentum

b) Electricity and magnetism encompassing:

- Electric fields

Note:

Examples are: Coulomb's law, principle of superposition, electric field, pictorial representation of electric fields, superposition of electric fields, electric field due to one or two charged plates, electric fields and conductors, electric field inside a hollow conductor, electric fields near sharp points

- The motion of charges particles in electric fields

Note:

Examples are: electric, potential difference, acceleration in a constant electric field, motion of a charged particle in a constant electric field

- Magnetic fields

Note:

Examples are: magnetic fields and their pictorial representation, magnetic force on a current-carrying conductor

- The motion of charges particles in magnetic fields

Note:

Examples are: force on a charged particle in a magnetic field, motion of a charged particle at right angles to a magnetic field

c) Light and matter

- Electromagnetic waves

Note:

Examples are: characteristics of electromagnetic waves, speed, frequency and wavelength

- The interference of light

Note:

Examples are: coherent wave sources, interference, two-source interference, diffraction, two-slit interference, transmission diffraction gratings, speckle

- Photons

Note:

Examples are: photons, the photoelectric effect, x-rays

- Wave behaviour of particles

Note:

Examples are: wave behaviour of particles, experimental evidence for wave behaviour of particles

d) Atoms and nuclei

- The structure of the atom

Note:

Examples are: line emission spectrum, energy levels in atoms, spectrum of atomic hydrogen, ionization energy, continuous spectrum, line absorption spectrum, fluorescence, stimulated emission

- The structure of the nucleus

Note:

Examples are: composition of nuclei, the nucleon force, isotopes, mass defect and binding energy, conservation laws in nuclear reactions

- Radioactivity

Note:

Examples are: stable and unstable nuclei, types of decay of unstable nuclei, alpha decay, beta minus decay, beta plus decay, half-life and activity

- Nuclear fission and fusion

Note:

Examples are: spontaneous and induced nuclear fission, chain reaction

e) Skills

- Experimental skills

Note:

Examples are: purpose and variables, procedure, observation, presentation, interpretation

- Investigation design skills

Note:

Examples are: designing and investigation, evaluating and investigation

- Information skills

Note:

Examples are: planning an information search, searching for information, evaluating information

- Communication skills

Note:

Examples are: oral communication, written communication, evaluation of oral and written communications

### 2.8.15.3 Fault current calculations

Evidence shall show an understanding of calculating fault current to an extent indicated by the following aspects:

- a) The Calculation of Fault Currents
- b) The calculation/determination of positive, negative and zero sequence impedances.
- c) Determination of fault current breaking and let-through energy capacities of protection devices.
- d) The influence of fault/arc impedances.
- e) Impedances operative for phase-to-phase and phase-to-earth faults.
- f) Calculation of fault currents for phase-to-phase and phase-to-earth faults.
- g) Approximation calculations by selecting the components with the major impedance.

## 2.9 Electronic principles and applications

### 2.9.1.1 Electronic component basics

Evidence shall show an understanding of the electronic components to an extent indicated by the following aspects:

a) Types of components

Note.

Examples of types are resistors, inductors, capacitors, diodes, transistor, integrated circuits, printed circuit boards, sub-assemblies, and mounting/enclosing, connection and termination hardware.

b) The physical features and primary characteristic of components.

Note.

1. Features include shape, size and connections
2. Characteristics include parameter and power ratings and polarity.

c) Methods of identifying and marking of component ratings.

d) Identifying and handling static sensitive components.

### 2.9.1.2 Electronic component parameters and selection methods

Evidence shall show an understanding of selecting electronic component to an extent indicated by the following aspects:

a) Circuit/apparatus parameters and specification

b) Component specifications and their implication in a given circuit.

c) Sources of components and technical data.

### 2.9.1.3 Single phase rectifiers

Evidence shall show an understanding of single phase rectifiers to an extent indicated by the following aspects:

a) Features and characteristic of rectifiers under load and no-load characteristics with and without capacitor filter.

Note:

Example include circuit configuration, filters, input and output wave forms, relationship between input and output voltages and ripple frequency and output voltage under load conditions

b) Faults in single phase rectifiers

c) Typical applications of single phase rectifiers

### 2.9.1.4 Frequency dependent circuit principles

Evidence shall show an understanding of frequency dependent circuit principles to an extent indicated by the following aspects:

a) Sinusoidal alternating voltage and current encompassing:

- How a sinusoidal voltage is generated in a single turn coil rotated in a uniform magnetic field
- Definition of the terms 'period', 'maximum value', 'peak-to-peak value', 'instantaneous value', 'average value', and 'root-mean-square value' in relation to a sinusoidal waveform
- Instantaneous value of induced voltage of a generated sinusoidal waveform

- Root-mean-square value and frequency of a sinusoidal waveform from values of peak voltage and period
  - Phase relationship between two or more sinusoidal waveforms from a given diagram of measurements
  - Sketches and names of common waveforms used in electronic circuitry
- b) Test equipment encompassing:
- Operating principles of a CRO including block diagram of functional areas
  - Set up, calibration and use of an oscilloscope to measure d.c. and a.c. voltages and frequency
  - Measurement of the instantaneous, peak, peak-to-peak values and the period of sinusoidal and other common waveforms provided by a single generator
  - Calibration and limitation of CRO probes
  - Use of signal generator as a voltage source
  - Analogue and digital a.c. measuring instruments including true root-mean-square reading instruments
- c) Phase relationships in a.c. circuits encompassing:
- Phasor representation of graphical waveforms
  - ‘in-phase’, ‘out-phase’, ‘phase angle’, ‘lead’ and ‘lag’
  - Convention for representing voltage, current and the reference quantity in a phasor diagram
  - Show the relationship between two or more a.c. values of voltage and/or current
- Note:  
Examples that may be used include phasor diagrams
- d) Single-source resistive a.c. circuits of various frequencies encompassing:
- Single source a.c. circuit and taking resistance, voltage and current measurements
  - Voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
  - Relationship between voltage drops and current in resistance a.c. circuit
- e) Inductance in a.c. circuits encompassing:
- Principles of inductance
  - Units by which inductance is measured
  - How a series d.c. circuit containing resistance and inductance behaves
  - Factors that determine inductance
  - ‘Inductive reactance’
  - Inductive reactance of a given inductor and show the relationship between inductive reactance and frequency
  - Applying Ohm’s Law to determine voltage, current or inductive reactance in a purely inductive a.c. circuit given in any two of these quantities
  - Examples of inductive components in circuits and systems and describe their effect on the phase relationship between voltage and current
  - Comparison of the current limiting characteristics of inductors and resistors
- f) Capacitance in a.c. circuits encompassing:
- ‘capacitive reactance’
  - capacitive reactance of a given capacitor and the relationship between capacitive reactance and frequency
  - series and parallel circuit rules to determine the equivalent capacitive reactance in

an a.c. circuit or any part of a circuit

- applying Ohm's law to determine voltage, current or capacitive reactance in a purely capacitive a.c. circuit given any two of these quantities
- examples of capacitive components in electronic circuits and systems and describe their effect on the phase relationship between voltage and current

g) Impedance in a.c. circuits encompassing:

- Definition of 'impedance'
- Impedance of series, parallel and series-parallel circuits and draw diagrams showing the relationship between resistive, inductive and capacitive components (impedance triangle)
- Single-source a.c. circuit with resistance, voltage and current measurements
- Determination of the voltage, current or impedance from measured or given values of any two of these quantities
- Using phasor diagrams to solve problems and show the relationship between voltages and currents in a.c. circuits
- True, apparent, reactive power and power factor

h) Ideal transformer encompassing:

- Step-up, step-down, turns ratios, voltage and current ratios
- Construction and operating principles
- Double wound and autotransformer types, multi-tap types
- Types of cores, applications
- VA rating

i) Resonance encompassing:

- Conditions in a circuit that produce resonance
- Relationship between resonance and frequency
- Effect on the current of series resonance and parallel resonance conditions
- The 'Q' of a coil and its relevance
- Bandwidth and half power points in a resonant circuit
- 'Selectivity'

j) Passive and active filters encompassing:

- Circuits for operation of the following passive filter circuits: high pass, band pass, band stop, notch
- Operation and frequency response of basic active filters based on the above circuit types
- Bandwidth, attenuation, roll off, order of filter
- Measurements and calculations relating to passive and active filters
- Curves showing the behaviour of various types of filter circuits

### 2.9.1.5 Basic electronic principles

Evidence shall show an understanding of basic electronic principles to an extent indicated by the following aspects:

a) Fundamental concepts

- insulators and conductors
- basic electrical units and engineering prefixes

- voltage, current and resistance
  - Ohm's Law
  - electrical power
  - digital and analogue multimeters
- b) Alternating Currents and Waveforms
- waveforms (sine and square wave)
  - the AC mains supply
  - electrical safety
  - fuses
  - lamps and indicators
- c) Electromagnetic Waves and Signals
- electromagnetic waves
  - the Radio Frequency spectrum
  - wave propagation
  - signals and bandwidth
  - transmission lines and antennas
  - harmonics
- d) Capacitance and inductance
- inductors and capacitors
- e) Electromagnetic Interference
- electrical noise
  - induced currents and voltages
  - cross-talk
  - electromagnetic Interference
- f) Batteries
- types of battery
  - battery capacity
  - care of batteries
- g) Techniques in the use of analogue and digital multimeters

Note:

Example is broad overview of electronics theory applicable to commonplace electronic and computer equipment servicing and support tasks, and includes general appreciation of the topics and concepts rather than rigorous theoretical calculations and designs

### 2.9.1.6 Basic digital principles

Evidence shall show an understanding of basic digital principles to an extent indicated by the following aspects:

- a) Analogue versus digital
- digital waveforms
- b) Number systems
- binary
  - hexadecimal
  - binary addition and subtraction

- number system conversions
- c) Codes
- ASCII
  - ANSI
  - error detecting codes
    - parity
    - check sums
    - CRC
  - error correction
- d) Basic logic
- AND, OR, NOT, XOR
  - truth tables
- e) Data manipulation
- clocks and data rates
  - basic storage cell
  - registers
  - ripple counter (binary counting)
  - shift register (serial to parallel conversion)
  - multiplexer and de-multiplexer
  - bus architecture
    - encoding / decoding
    - addressing methods
- f) Analogue to digital conversion
- g) Digital to analogue conversion

Note:

Example include a broad overview of digital electronics theory applicable to everyday computer servicing and support tasks and encompasses topics and concepts and is not for in depth theoretical calculations and designs. Also there is no specific logic gates or logic levels involved.

## 2.9.2 Multiphase rectifiers

Evidence shall show an understanding of the characteristics and applications of multiphase phase half- wave and full-wave rectifiers to an extent indicated by the following aspects:

- a) Features and characteristic of rectifiers under load and no-load characteristics with and without capacitor filter.

Note:

Example include circuit configuration, filters, input and output wave forms, relationship between input and output voltages and ripple frequency and output voltage under load conditions.

- b) Faults in multiphase rectifiers
- c) Typical applications of multiphase rectifiers

### 2.9.3.1 Voltage regulators

Evidence shall show an understanding of the characteristics and applications of linear and non-linear voltage regulators to an extent indicated by the following aspects:

- a) The purpose of voltage regulation

- b) The features and characteristics of series, shunt and three terminal regulators.

Note

Example of features and characteristics are circuit configuration, regulating action and over-current and voltage limiting methods.

- c) The features and characteristics of switching regulators.

Note:

Example include regulator components, step-up, step-down, voltage-inverting and converting configurations, regulating action and forms of protection.

- d) Faults in linear and non-linear regulators

- e) Typical applications of voltage regulators

### **2.9.3.2 Inverters**

Evidence shall show an understanding of the characteristics and applications of inverters to an extent indicated by the following aspects:

- a) Features and characteristic of inverters under load and no-load characteristics.

Note:

Example include circuit configuration, input and output wave forms, relationship between input and output voltages and output voltage under load conditions.

- b) Faults in inverters

- c) Typical applications of inverters

### **2.9.3.3 Electronic switching**

Evidence shall show an understanding of the characteristics and applications of electronic switching to an extent indicated by the following aspects:

- a) Devices and used for electronic switching and their switching characteristic
- b) Circuit configuration and switch-on, switch-off conditions
- c) Faults in electronic switching devices/circuits
- d) Typical applications of electronic switching

### **2.9.4.1 Digital electronic fundamentals**

Evidence shall show an understanding of the characteristics and applications of the fundamentals of digital electronics to an extent indicated by the following aspects:

- a) Differences between analogue and digital signals
- b) Prediction of output state of logic gates for various input combinations
- c) Hexadecimal, binary and decimal number systems
- d) Precautions when handling electronic devices due to electrostatic discharge
- e) Operation and characteristics of LEDs and LCDs
- f) Digital sub-systems and timing diagrams
- g) Operation of flip-flops and counters
- h) Logic device terminal characteristics
- i) Analysis and operations of encoders, decoders and multiplexes
- j) Operation of flip-flops, latches, registers, shift-registers, counters and multi-vibrators
- k) Operation and characteristics of Analogue to Digital and Digital to Analogue devices

### 2.9.4.2 Digital signal processing

Evidence shall show an understanding of the digital signal processing and applications to an extent indicated by the following aspects:

a) DSP applications encompassing:

- block diagram of a DSP system.
- DSP applications:

Note.

Examples are Audio-response equalization, Echo-cancelling on telephone lines, Tracking filters for radio communications, Loudspeaker testing, Voice compression and the like.

b) Way in which the sampling process changes the signal encompassing:

- Shannon's Sampling Theorem.
- quantisation noise introduced by A/D and D/A signal-conversion in a given DSP system.
- spectrum of a sampled signal.
- response required for the input anti-alias filter.
- response required for the output reconstruction filter, including  $\sin(x)/x$  compensation.

c) Impulse response of a linear-phase filter encompassing:

- frequency-response (amplitude and phase) for low-pass (LP), bandpass (BP) or high-pass (HP) filter.
- impulse-response for LP, BP or HP filters
- approximate number of impulse-response coefficients needed in a Finite Impulse Response (FIR) filter
- unwindowed impulse-response for a linear-phase LP, BP or HP filter.
- von Hann ('Hanning') or Hamming window
- impulse-response coefficients for LP, BP and HP filters.

d) FIR filter encompassing:

- process of convolution.
- standard expression for discrete convolution.
- DSP system and convolution.
- DSP system to implement a FIR filter.

e) Adaptive filter encompassing:

- Least Mean Square (LMS) algorithm.
- practical applications for adaptive filters.
- number of taps needed on an adaptive filter for a given application.
- DSP system and implementation of adaptive filter.

f) Architecture of a specific DSP chip encompassing:

- features of the DSP chip that contribute to a high processing speed.
- function of all registers in the DSP chip.
- circuit diagrams showing how the DSP chip is interfaced to EPROM, RAM, an A/D converter and a D/A converter.
- chip synchronises and signal-sampling.
- execution time for processing for FIR filter.

g) DSP system encompassing:

- assembly code programs using a micro assembler for the selected DSP chip.
  - DSP programs simulator tests
  - emulator or development system
- h) Integer arithmetic encompassing:
- decimal numbers in +1.0 to -1.0 range converted into 16-bit signed integers and/or to signed integers of any other data-length used by the selected DSP chip.
  - signed integers converted to numbers in the range +1.0 to -1.0.
  - effect of arithmetic overflow and under-flow on the digital signal.
  - effect of coefficient rounding error on FIR filters.
- i) Input and output analog filters encompassing:
- input anti-alias filter using standard switched-capacitor filters.
  - output reconstruction filter using standard switched-capacitor filter.
  - circuit diagram showing how the filters interface to the DSP system.

### 2.9.4.3 Digital signal processing development

Evidence shall show an understanding of the digital signal processing development technologies to an extent indicated by the following aspects:

- a) Infinite Impulse Response (IIR) filter encompassing:
- pole-zero placement method to obtain coefficients for a simple first-order and second-order low-pass and band-pass IIR filter.
  - bi-linear Z-transform to obtain the filter coefficients for a simple first-order and second-order low pass IIR filter.
  - direct-form realisation of a simple IIR filter suitable for  $\sin(x)/x$  compensation.
  - DSP system
- b) High-order IIR filter encompassing:
- filter design package to obtain the coefficients for a high-order IIR filter
  - high-order IIR filter would be realised using a cascade or a parallel combination of first-order or second-order IIR filter blocks.
  - effect of coefficient quantisation errors and calculation rounding-off errors on filter performance.
  - IR filters and symmetrical FIR filters
- c) Discrete Fourier Transform (DFT) to a signal encompassing:
- discrete correlation.
  - signal-detection.
  - correlation used to generate DFT.
  - window-function when generating the DFT.
- d) Concept of complex signals encompassing:
- positive-frequency and a negative frequency signal.
  - exponential and polar form of sinusoidal signal and a complex sinusoidal signal.
  - spectra of a general signal having equal real and imaginary components. (An “analytic” or “quadrature” signal).
  - analytic signals simplification filtering operations
- e) Fast Fourier Transform (FFT) encompassing:
- Decimation in Time FFT, and the “twiddle factor”.

- sample-frequency and number of signal samples needed for a FFT.
  - FFT routine.
- f) FIR filtering using FFT encompassing:
- overlap, save method of implementing a long FIR filter using the FFT and the inverse FFT.
  - limitations on the stored frequency-response coefficients and the resulting impulse-response.
- g) Data-rate conversion encompassing:
- data-rate conversion (decimation) simplification of the anti-alias filter requirement
  - data-rate conversion (interpolation) of the DSP system simplification the reconstruction-filter requirement and reduces the need for  $\sin(x)/x$  compensation.
- h) Modulation and de-modulation techniques encompassing:
- Spectra where real signals and analytic (quadrature) signals are modulated by a sinusoidal function.
  - amplitude-modulated signal
  - single-sideband signal
- i) Digital processing steps in practical DSP applications
- j) Currently available DSP support chips

#### 2.9.4.4 Digital applications

Evidence shall show an understanding of the digital applications to an extent indicated by the following aspects:

- a) Two level, four input combination logic circuits encompassing:
- Boolean expression and/or truth table.
  - De Morgan's Law and other simple identities
  - Karnaugh Map or Boolean algebra
  - 'don't cares' to simplify logic implementation.
- b) Propagation delays in a 2 level circuit encompassing:
- total worst case propagation delay in a simple combination circuit.
- c) Types of oscillators encompassing:
- Schmitt trigger input.
  - Schmitt trigger oscillator.
  - simple RC oscillator.
  - crystal oscillator.
- d) Re-triggerable and non-re-triggerable Monostables encompassing:
- R and C values to produce a given output pulse width.
  - monostable to achieve pulse stretching/shortening, pulse delaying and switch debouncing.
  - Modulo N M.S.I asynchronous counters and analyse modulo N M.S.I synchronous counters. Cascading limited to two M.S.I devices.
  - enabling, loading, counting, and cascading counters from manufacturer's data sheets.
  - operation of up to 2 chip M.S.I counter.
- e) Characteristics of Ram and ROM encompassing:

- memory parameters, including access time, array size, memory refresh, low-power mode.
  - pin functions.
  - timing parameter from data sheets (not including DRAM).
  - characteristics of commonly used memory devices, including RAM, DRAM, NVRAM, ROM, EPROM and E<sub>2</sub>ROM.
- f) Circuits applying M.S.I devices encompassing:
- decoded memory system.
  - waveform generator using a multiplexer and a counter (up to 16 states).
  - typical analogue to digital and digital to analogue converters.
  - A to d and D to A converters

### 2.9.5.1 Microprocessor fundamentals

Evidence shall show an understanding of the characteristics and applications of microprocessors to an extent indicated by the following aspects:

- a) Blocks and buses that comprise a microprocessor or microcontroller system
- b) Memory organisation, operation and addressing methods used with semiconductor read/write memories (RAMs) and read-only memories (ROMs)
- c) Differences between a microprocessor and microcontroller and their usages
- d) Microprocessor/microcontroller architecture and operation encompassing:
  - central processing unit (CPU)
  - register array
  - instruction register/decoder
  - arithmetic logic unit (ALU)
  - accumulator and flags
  - instruction cycle timing
  - control lines
  - stack pointer
  - index register
  - general purpose registers
- e) System clock circuits fetch and execute encompassing:
  - timing cycle
  - timing relationship to system clock
  - logic levels of system buses for each clock period of an instruction cycle

### 2.9.5.2 Microcontroller fundamentals

Evidence shall show an understanding of microcontroller fundamentals to an extent indicated by the following aspects:

- a) Microcontroller architecture
- b) Program storage types
- c) Data storage types
- d) I/O Ports: analogue/ digital
- e) Integrated Peripherals: timers, interrupts etc

- f) Control circuitry: system clock, reset etc
- g) Industry standard programming environment

### 2.9.6 Operational amplifiers

Evidence shall show an understanding of the fundamental principles of amplifiers characteristics and the applications of operational amplifiers to an extent indicated by the following aspects:

- a) The purpose and application of amplifiers
- b) The basic characteristics of small signal amplifiers.

Note:

Features and characteristics include input and output impedance, current and voltage gain and bandwidth

- c) Various operational amplifier circuit configurations and where they are used.
- d) Measures and calculated values of gain and output voltage for various operational amplifier configurations

Note:

Circuit configurations include inverting, non-inverting, voltage follower, summing, comparators and Schmitt trigger differential configurations

#### 2.9.7.1 Single phase power control

Evidence shall show an understanding of the characteristics and applications of single phase power control to an extent indicated by the following aspects:

- a) Types of electronic devices, their operating principles and characteristics

Note.

Examples are SCRs, Triacs power transistors and the like.

- b) Applications, circuit configuration and operating parameters

Note.

Examples of applications are applications solid state switches, lighting dimmers, single phase motor speed and efficiency control and the like.

- c) Typical faults, their symptoms and cause.
- d) Testing procedures and test points

#### 2.9.7.2 Polyphase power control

Evidence shall show an understanding of the characteristics and applications of single phase power control to an extent indicated by the following aspects:

- a) Applications, circuit configuration and operating parameters

Note.

Examples of applications are applications polyphase rectifiers, inverters, voltage and frequency control polyphase phase motor speed and efficiency control and the like.

- b) Typical faults, their symptoms and cause.
- c) Testing procedures and test points

### 2.9.8 Amplifier fundamentals

Evidence shall show an understanding of amplifier fundamentals to an extent indicated by the following aspects:

a) Basic op amp configurations encompassing:

- ideal operational amplifier characteristics gain, bandwidth, input and output resistance.
- the inverting amplifier circuit calculating voltage gain and input resistance.
- the non-inverting amplifier circuit calculating voltage gain and input resistance.
- the inverting summer circuit calculating output voltage for given input voltages.
- voltage follower.
- differential amplifier circuits, differential amplifier using op amps need for balancing circuit resistances.

b) Op amp limitations encompassing:

- non-ideal characteristics of an op amp manufacturers' specifications compared to ideal characteristics.
- need for frequency compensation in some types of op amps using manufacturers' data to apply frequency compensation.
- offset nulling methods used manufacturers' data.
- bias compensation need for equal DC resistance between each input and the common line.
- slew rate definition of term specifications of slew rate for typical op amps.
- frequency response how frequency response varies with circuit gain bandwidth product frequency response characteristics for different op amp types definition of bandwidth.

c) Comparators encompassing:

- effect of using an op amp in open loop operation.
- basic configuration of a comparator.
- analysis of comparator operation.
- how positive feedback is applied applications.
- Schmitt trigger basic principle of operation advantages applications.
- comparator circuit applications.
- types of comparator ICs.

d) Op amp applications encompassing:

- clipping circuits and precision rectifiers principle of operation applications.
- RC sine wave oscillators, block diagram, Wien bridge oscillator configuration, basic operation phase shift oscillator, basic operation applications.
- square wave oscillators, converting a sine wave to a square wave using a comparator, applications.
- op amp integrator circuits, circuit configuration, output voltage for a given DC input voltage, why ramp is linear, relationship of time constant of the circuit to output, waveform and applications.
- differentiator circuits, circuit configuration, output waveform for a given input waveform, effect on waveform if the time constant is changed applications.
- function generators, block diagram, output waveforms applications.
- active RC filter circuits (basic types only), principle of operation, low pass and high pass filter circuit configurations, band pass and band stop filter circuit configurations applications.

**2.9.9.1 Advanced amplifiers**

Evidence shall show an understanding of advanced amplifiers to an extent indicated by the following aspects:

- a) Determination of d.c. bias conditions for a single-stage amplifier
- b) Determine the small signal terminal characteristics of single-stage amplifiers
- c) Effects of coupling and by-pass capacitors in single-stage amplifiers

**2.9.9.2 Amplifier applications**

Evidence shall show an understanding of amplifier applications to an extent indicated by the following aspects:

- a) Operation of multistage amplifiers
- b) Effects of component values and frequency response
- c) Identification of components which comprise the negative feedback loop in multistage amplifiers
- d) Effect of negative feedback on amplifier parameters
- e) Predictable effects on the output voltage when amplifiers are subjected to control signal overdrive, bias faults and amplifying device faults

**2.9.9.3 Microwave amplifiers**

Evidence shall show an understanding of microwave amplifiers to an extent indicated by the following aspects:

- a) Applications and operational constraints
- b) Operating principles and parameters
- c) Amplifier components and circuit configuration
- d) Amplifier faults, symptoms and causes

**2.9.10 Reserved****2.9.11 Linear and switch mode power supplies**

Evidence shall show an understanding of linear and switched mode power supplies to an extent indicated by the following aspects:

- a) Operation and characteristics of switched mode power supplies
- b) Isolation requirements and circuitry
- c) Operation of step-down and step-up regulators
- d) DC to DC converters
- e) Operation of variable frequency and pulse width modulated regulation techniques
- f) Radiation suppression circuitry
- g) Diagnostic procedures to isolate faults

**2.9.12 Electronic fault finding**

Evidence shall show an understanding of electronic fault finding techniques to an extent indicated by the following aspects:

- a) Factors to consider in clarifying the nature of a fault encompassing:
  - Initial fault report
  - Confirmation of symptoms of the fault
  - Comparison of symptoms with normal operation
- b) Effect to cause reasoning — assumptions of possible causes
- c) Methods for testing assumptions encompassing:
  - Visual inspection
  - Sectional testing
  - Split-half tests
  - Component isolation
- d) Dealing with intermittent faults

Note:

Typical causes of intermittent faults are vibration, shock, changes in temperature and electromagnetic interference.

### **2.9.13 Measurement circuits and applications**

Evidence shall show an understanding of measurement circuits and applications to an extent indicated by the following aspects:

- a) Principles of measurement
- b) Circuit components and configurations
- c) Applications of measurement circuits

### **2.9.14 Fundamentals of calibration**

Evidence shall show an understanding of fundamentals of calibration to an extent indicated by the following aspects:

- a) Calibration processes
- b) Need for calibration
- c) Metrology standards
- d) Traceability
- e) Electrical measuring instruments and devices
- f) High order frequency references
- g) Counters
- h) Signal and function generators

### **2.9.15 Audio and video component functional controls**

Evidence shall show an understanding of the functional controls of audio and video components to an extent indicated by the following aspects:

- a) Types of components and their functional controls
- b) Function set up procedures
- c) Testing

### 2.9.16.1 Sound reproduction fundamentals

Evidence shall show an understanding of sound reproduction fundamentals to an extent indicated by the following aspects:

- a) Sound wave propagation
- b) Timbre of sound
- c) Effects of other medium of sound waves
- d) Characteristics of the human ear
- e) Difference between mono and stereo
- f) Surround sound principles

### 2.9.16.2 Acoustics, spatial treatment and sound reproduction

Evidence shall show an understanding of acoustics, spatial treatment and sound reproduction to an extent indicated by the following aspects:

- a) Effects of room dimensions, spatial shape and surface textures on acoustics
- b) Ideal acoustic for specific purposes

Note.

Examples of specific purposes are speech, solo or small group music, rock music orchestral music, choral music, cinema and the like.

- c) Measuring room response
- d) Speaker placement and room response
- e) Room treatment methods to improve acoustic response
- f) Active methods to improve acoustic response

### 2.9.17.1 Audio reproduction, electronic components

Evidence shall show an understanding of electronic components for sound reproduction to an extent indicated by the following aspects:

- a) Preamplifiers amplifier encompassing:
  - Function in the reproduction chain
  - Typical circuit arrangements
- b) Power and integrated amplifiers encompassing:
  - Function in the reproduction chain
  - Typical circuit arrangements
- c) Graphic equalizers encompassing:
  - Function in the reproduction chain
  - Typical circuit arrangements
- d) Component interconnections

### 2.9.17.2 Audio component repair basics

Evidence shall show an understanding of the basics of audio component repair to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Common faults, their symptoms and cause.
- c) Fault location procedures and testing points

d) Device adjustments

Note.

Example of audio components are preamplifiers amplifier, power and integrated amplifiers, graphic equalizers and the like.

**2.9.18 Audio reproduction, speaker fundamentals**

Evidence shall show an understanding of speaker fundamentals to an extent indicated by the following aspects:

- a) Types of speaker drives and their operating mechanism
- b) Speaker cabinet characteristics
- c) Purpose and circuit arrangement of typical cross-over networks
- d) Speaker connections

**2.9.19 Audio/video recording and replay components repair basics**

Evidence shall show an understanding of basic repairs to electronic components for audio/video recording and replay to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Common faults, their symptoms and cause.
- c) Fault location procedures and testing points
- d) Device adjustments

Note.

Examples of audio/video recording and replay components are audio cassette player/recorders, compact disk players, video cassette player/recorder, digital versatile disk and super audio compact players.

**2.9.20 Business equipment operational functions**

Evidence shall show an understanding of business equipment electronic components to an extent indicated by the following aspects:

- a) Type of business machines and their application.
- b) Default and user choice functions.
- c) Setting up procedures.

**2.9.21 Business equipment components**

Evidence shall show an understanding of business equipment electronic components to an extent indicated by the following aspects:

- a) Operating principles of components encompassing:

- Stepper and pulse motors
- Relays and Solenoids
- Clutches

Note.

Examples are magnetic, spring, tight and loose slip, friction, one way spring and torque – limited clutch

- Tacho sensors
- Chains and gearing

- Pulleys and belt drives
  - Vacuum feeds
  - Feed rollers
  - Separation pads
- b) Equipment maintenance encompassing:
- Anti static brushes
  - Conductive/non conductive greases
  - Correct use of oil
- c) Transducers types and application encompassing:
- Linear position and velocity
  - Angular position measurement
  - Angular velocity measurement
  - Temperature sensors
  - Humidity sensors
  - Current sensors
  - Piezo sensors
- d) Temperature sensors and applications encompassing:
- Thermocouples
  - Resistance temperature detectors (RTD)
  - Thermistors
  - Bimetal temperature sensors
- e) Optoelectronics devices and applications encompassing:
- Photoresistors
  - Photodiodes
  - Phototransistors
  - LASCR
  - Photovoltaic devices
  - Optocouplers
  - Laser
- f) Operation of input accessories encompassing:
- paper trays
  - high capacity bins
  - document feeders
  - duplex unit
  - manual bypass
  - coin boxes
  - card readers
  - raster image processing unit
  - Toners and cartridges
- g) Operation of output accessories encompassing:
- sorters
  - staplers
  - collators

- folders
- stackers

## **2.9.22 Gaming machine systems and equipment overview**

Evidence shall show an understanding of gaming machine systems and equipment to an extent indicated by the following aspects:

- a) Gaming industry terminology
- b) Functions and specifications of the machine and its components
- c) Types of gaming machines
- d) Operational features of different machines and systems

### **2.9.23.1 Gaming machine equipment adjustment and maintenance**

Evidence shall show an understanding of gaming equipment adjustment and maintenance to an extent indicated by the following aspects:

- a) Machine access and security encompassing:
  - master reset procedures,
  - opening and closing doors,
  - period reset procedures,
  - use of audit and reset key
- b) Adjustments and clearances encompassing:
  - Coin/note jams
  - Hopper to coin chute
  - Screens
  - Touch screen calibration
- c) Removals, installs and checks encompassing:
  - Bank note acceptors,
  - Card readers
  - Coin comparators,
  - Divertor
  - Drop doors
  - Hopper
  - Lighting
  - Machine positioning and mounting
  - Printer paper roll feeding
  - Switches
- d) Attendant screens and functions

### **2.9.23.2 Gaming machine fault finding**

Evidence shall show an understanding of finding faults in gaming machines to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Common faults, their symptoms and cause.

- c) Fault location procedures and testing points
- d) Device adjustments

### **2.9.24 Cathode ray tube displays**

Evidence shall show an understanding of cathode ray tube displays to an extent indicated by the following aspects:

- a) Operation and characteristics of various types of cathode-ray tubes including delta, in-line and precision in-line
- b) Voltages, statics and x-rays around CRTs
- c) Set up and adjustment techniques
- d) Rear and front projection TV systems
- e) Typical faults

### **2.9.25 Plasma displays**

Evidence shall show an understanding of plasma displays and their circuit control operation to an extent indicated by the following aspects:

- a) Advantages of flat panel displays (over conventional CRT's, Raster geometry etc)
- b) Theory of plasma gas discharge and phosphor excitation
- c) Scanning techniques (column/row addressing)
- d) Luminance/colour aspects (the need to re-address pixels to control light output)
- e) Gamma correction considerations. (reversal of the gamma correction that is carried out at the TV studio to compensate for the non-linearity of light output of a conventional CRT)
- f) Plasma flat panel construction (and handling)

#### **2.9.26.1 Liquid crystal displays**

Evidence shall show an understanding of liquid crystal displays and the control circuit operation to an extent indicated by the following aspects:

- a) Principles of transmissive LCD displays (as opposed to reflective types)
- b) Light polarisation. (polarisation twisting characteristics of liquid crystal and the need for polarisation filters in display panel)
- c) Voltage/current requirements and need for electric field
- d) Fluorescent back light (need for high frequency operation and power requirements)
- e) Scanning techniques (colour/row addressing and thin film transistors)
- f) Light attenuation (caused by the many layers/filters the back light has to pass through)
- g) Construction and handling

#### **2.9.26.2 Display circuit diagnostics**

Evidence shall show an understanding of display circuit diagnostics to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Factors effecting system performance
- c) Typical faults, their symptoms and cause.
- d) Fault diagnosis procedures and testing

e) Sub-system adjustments

**2.9.27 Digital versatile disc (DVD) and compact disc (CD)**

Evidence shall show an understanding of DVDs and CDs to an extent indicated by the following aspects:

- a) Operational principles and standards of digital signal processing
- b) Standards and features of DVDs and CDs
- c) Operation and adjustment of DVDs and CDs, as well as
  - Transport mechanisms
  - Laser alignment/tracking
  - Servo system description, operation and adjustment of servo loops
  - System control of player
  - On screen display including service mode set-up on adjustment

**2.9.28 Hand held remote control units**

Evidence shall show an understanding of hand held remote control units to an extent indicated by the following aspects:

- a) Remote control requirements, specifications, multiple systems, code formats, bit sync, system address, commands, timing (clock accuracy), modulation system, infrared system, transmission errors, methods used to reduce battery power, key scanning and displays
- b) Data monitoring points, timing and amplitude specifications, triggering of serial data, data/graticule alignment, identify and decode start bits, system address bits, command bits, stop bits, load and other bits
- c) Remote control measurements, battery voltage range, battery stand-by current, battery transmit current. DC voltage and waveforms on IC pins. Frequencies
- d) System controller requirements including remote, local, main housekeeping.
- e) Methods of inter-chip data communications

**2.9.29 Television scanning and deflection**

Evidence shall show an understanding of television scanning and deflection to an extent indicated by the following aspects:

- a) Operation of a synchronised separator, synchronised horizontal oscillator and drive stages, horizontal transistor output stage
- b) Operation of and repair to vertical deflection circuitry
- c) Operation of Raster correction circuits

**2.9.30 Television chrominance and luminance**

Evidence shall show an understanding of television chrominance and luminance to an extent indicated by the following aspects:

- a) Chrominance and luminance signal processing at the transmitter
- b) Luminance signal process in the receiver including video buffer, traps and filters, video amplifiers, video output stages, brightness and contrast circuits
- c) Chrominance signal processing in the receiver including, chroma decoder, sub-carrier

regeneration, chroma signal processing, final matrix output.

### **2.9.31.1 Television and video reception**

Evidence shall show an understanding of television reception signals and decoding to an extent indicated by the following aspects:

- a) Broadcast systems
- b) Basic operation of a TV cameras
- c) Basic operation of a TV receiver including tubes and displays and operating components
- d) Reception aerials and arrays
- e) Operation of a video cassette recorder including tape recording, helical scanning, mechanical principles and adjustments, electronic principles and adjustments, servo control loops

### **2.9.31.2 Power supplies for TVs and VCRs**

Evidence shall show an understanding of power supplies for TV and VCR to an extent indicated by the following aspects:

- a) components providing RFI suppression protection, rectification and filtering in a typical TV power supply.
- b) safe working procedures to test the power supply circuitry of a typical “hot chassis” television receiver.
- c) The operation of series regulated power supplies as used in typical TV receiver/monitors and VCRs.
- d) Subsystem arrangements and the operating principles of series and shunt type TV/VCR SMPS .
- e) The operation of the SMPS control circuits in a TV/VCR.
- f) The operation of typical self-oscillating TV/VCR SMPS circuits.
- g) Techniques for locating and repairing faults in a defective SMPS in a typical TV/monitor or VCR.

### **2.9.31.3 Television RF stages**

Evidence shall show an understanding of television RF stages to an extent indicated by the following aspects:

- a) The operation of tuners found in typical TV receivers.
- b) Techniques for locating and repairing faulty components in VST and FST tuning systems in typical TV receivers or VCRs.
- c) Techniques for locating and repairing faults in typical vision IF circuits.
- d) The operation of and fault find a typical TV synchronous demodulator circuit.
- e) AGC circuits in typical TV receivers encompassing:
  - Operation
  - Fault finding techniques .

### **2.9.32.1 Camcorders and digital cameras**

Evidence shall show an understanding of camcorders and digital cameras to an extent

indicated by the following aspects:

- a) Operation of camera circuits
- b) Recording media, standards and formats
- c) Pick up tubes and charge coupled devices
- d) Operation of optical transducers, lenses
- e) Colour separation techniques and signal processing
- f) Charge coupled devices
- g) Mechanics and adjustments
- h) Power supplies and batteries
- i) MPEG capability

### **2.9.32.2 Camera circuits diagnostics**

Evidence shall show an understanding of camera circuit diagnosis to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Environment factors effecting system performance
- c) Typical faults, their symptoms and cause.
- d) Fault diagnosis procedures and testing
- e) Sub-system adjustments

### **2.9.33 Video cassette recorder**

Evidence shall show an understanding of video cassette recorders to an extent indicated by the following aspects:

- a) Operation and practical application of chrominance processing principles
- b) System control sections, typical analogue and digital servo systems
- c) Circuit operation involving high fidelity, tracking, picture storage, still pictures
- d) Locate faults in the following sections: mechanical, luminance, chroma, servo control, system control, timer and display control, sound, RF and power supply

### **2.9.34.1 Digital television receivers**

Evidence shall show an understanding of digital television receivers to an extent indicated by the following aspects:

- a) Integrated Receiver Decoder IRD (The Set Top Box) encompassing:
  - sub-system components (i.e. functional blocks) and their operating parameters
  - Basic diagnostic tests
- b) Channel decoders encompassing:
  - Method used to determining the analogue to digital converter (ADC) sampling rate.
  - Function of the Forward Error Correction (FEC) unit and Reed Solomon (RS) and Viterbi plus interleaving.
  - Purpose of the OFDM modulator.
  - Principle of operation of an OFDM demodulator and hierarchical (de) modulation.
  - Principles of operation of a QPSK demodulator.

- Perform measurements and diagnostic test points in a typical IRD channel decoder.
- c) Conditional access encompassing:
- Purpose of a conditional access module (CAM).
  - Access descrambler unit sub-system components (i.e. functional blocks) and their operating parameters
  - Function of the component parts of conditional access descrambler unit.
  - Purpose of a conditional access module 'smart card'.
  - Single chip set top box sub-system components (i.e. functional blocks) and their operating parameters
- d) Repair and maintenance of digital television signal decoding circuitry. encompassing:
- Correct operation of the transport stream processor with reference to typical input and output signal.
  - Testing techniques to determine correct operation of the video decoder, audio decoder and PAL encoder
  - Testing techniques to determine identify faulty data streams.
  - Pin connections of a SCART socket.
  - Operation of a typical UHF modulator.
  - List precautions to be observed when performing tests on functional and non-functional units.
  - Identify and replace faulty components in malfunctioning units.
  - Perform functional testing after repair.

### 2.9.34.2 Digital television principles

Evidence shall show an understanding of digital television principles to an extent indicated by the following aspects:

- a) Describe the basic techniques used to process an analogue signal for integration in a digital broadcasting system encompassing:
- Basic technique of sampling an analogue waveform and assigning quantisation levels to those samples for both video and audio.
  - Calculation of the number of pixel's per line and the sampling rate for a range of typical DTV aspect ratios.
  - Typical sampling rates for Standard Definition Digital Television (SDTV) and High Definition Digital Television (HDTV) broadcasts.
  - Range of different sampling structures used to sample luminance and colour difference signals.
  - Determination of the total bit rate required for a required sampling rate.
  - Factors limiting digital television picture quality.
  - Minimum MPEG video requirements for HDTV and SDTV.
  - Factors that create the need for video data compression.
- b) Describe the process used to prepare video data for integration encompassing:
- Major methods used to compress video data.
  - How a complete picture frame is assembled from samples, blocks, macroblocks and slices.
  - Meaning of the terms DCT coefficients, temporal frequency, spatial frequency, temporal and spatial redundancy.

- Purpose of the Discrete Cosine Transfer (DCT) processor in the processing of video data compression.
  - Relationship between spatial frequencies, DCT coefficients and quantisation levels in the DCT block.
  - Compression techniques used to code quantised DCT coefficients.
  - How Run Length Coding (RLC) is used to group DCT values into a series of values.
  - How Variable Length Coding (VLC or Huffman coding) processes each DCT value according to probability.
- c) Describe the role of the DCT coder encompassing:
- Sub-system components (i.e. functional blocks) and their operating parameters of a DCT coder.
  - Typical construction of a Group of Pictures (GOP).
  - Individual frames in a GOP sequence that uses forward prediction and bi-directional prediction.
  - Purpose of differential coding.
  - Structure of a video Packetised Elementary Stream (PES).
  - Types of information included in the PES.

### 2.9.34.3 Advanced digital television principles

Evidence shall show an understanding of advanced digital television principles to an extent indicated by the following aspects:

- a) Audio component encompassing:
- Audio Encoding
  - Audio Masking
  - Audio sub band encoding
- b) Dolby AC-3
- c) MPEG-2 System Layer encompassing:
- PES Packet Construction
  - Time Stamps
  - Programme Clock Reference (PCR)
  - Transport Packet Header
  - Programme Specific Information (PSI)
- d) Channel Encoding
- Forward Error Correction (FEC)
  - Bit Error Rate (BER)
  - Puncturing
- e) Interleaving.
- f) Modulation
- Phase Shift Keying (PSK)
  - Quadrature Amplitude Modulation (QAM)
  - Orthogonal Frequency Division Multiplexing (OFDM)
  - Coded Orthogonal Frequency Division Multiplexing (COFDM)

- g) Hierarchical Modulation.
  - Terrestrial Channel Encoder
  - Satellite Channel Encoder
  - Carrier to Noise Ratio (C/N)
- h) Single Frequency Networks
  - Guard Interval
  - Megaframes

### **2.9.35 Micro computer systems**

Evidence shall show an understanding of micro computer systems to an extent indicated by the following aspects:

- a) Function of block diagrams related to programmable peripheral interface, programmable interval timer, universal asynchronous receiver transmitter, programmable interrupt controller, programmable memory access controller, bus controllers, floppy disk controller, cathode ray tube controller
- b) Function of pins on common micro processor peripheral ICs
- c) Software for initialisation
- d) Use of the operational mode
- e) Interfacing of IC peripherals

### **2.9.36 Fire detection and warning system and apparatus fundamentals**

Evidence shall show an understanding of fire detection and warning systems to an extent indicated by the following aspects:

- a) Purpose of fire alarm and warning systems.
- b) Purpose and operating principles of fire detection and warning systems.
- c) Operating principles and characteristic of the various types of fire alarm detectors.
- d) Operating principles and characteristic of the various warning system components
- e) Effective and ineffective locations for fire detection devices and common causes of false alarms.
- f) Warning devices and their operating parameters
- g) Common operational requirements and types of control and indicating equipment.
- h) Common operation and types of field data gathering equipment
- i) Common operation and interface connections to other systems.
- j) Purpose and interface requirements to smoke hazard management system

### **2.9.37 Fire alarm routine testing**

Evidence shall show an understanding of fire alarm and warning system routine testing to an extent indicated by the following aspects:

- a) Types and uses of test equipment
- b) Fire alarm and warning system components and their location
- c) Periodic testing requirements to meet manufacturer's and standards requirements

### **2.9.38 Tape recorders**

Evidence shall show an understanding of tape recorders to an extent indicated by the following aspects:

- a) Processors involved with magnetic analogue tape recording
- b) Components and circuitry associated with tape transport, erasure and record bias, recording, play back and noise reduction
- c) Warn or faulty tape transport components and circuits
- d) Inspection of head condition using a microscope and the effects on the output caused by head-wear and oxide build-up

### **2.9.39 AM and FM tuners**

Evidence shall show an understanding of AM and FM tuners to an extent indicated by the following aspects:

- a) Superheterodyne receivers
- b) Operational characteristics and techniques used in AM and FM receivers
- c) Frequency modulation, stereo encoding and de-coding used in commercial FM transmissions
- d) Amplitude modulation and de-modulation used in commercial AM transmissions
- e) RF signal requirements for AM tuners
- f) RF signal requirements for stereo FM tuners

### **2.9.40 Integrated audio systems**

Evidence shall show an understanding of integrated audio systems to an extent indicated by the following aspects:

- a) Types of audio control and switching devices
- b) Types of surround sound systems
- c) Operation of system control circuits, including the remote device

#### **2.9.41.1 Security systems installation basics**

Evidence shall show an understanding of security systems installation to an extent indicated by the following aspects:

- a) Circuit arrangements encompassing:
  - range of typical resistor values used in alarm systems
  - reasons for End Line Resistor (ELR) systems in ELR circuits, balanced bridge circuits and the two resistor ELR
  - wiring of a single EOL resistor to provide a sealed condition
  - wiring of a detector with split EOL resistors to provide a sealed condition
  - how zone doubling can be accomplished through the use of dual EOL resistors
  - effects of open circuits and short circuits on alarm inputs
- b) Construction and operating principles and application of mechanical detectors

Note.

Example are magnets, vibration (hammer type, ball & pin type), switches, pressure mats, trip wires, window tape, and the like

- c) Construction and operating principles and application of electro-mechanical detectors

Note

Example are single twin type, beam fence, missing pulse system, glass break, smoke, ultra sonic, optical fibre, strain system, resistance circuit and the like

d) Operating requirements and application of passive infra-red detectors encompassing:

Note.

Examples are barrier lens, dual corridor lens, long range lens, and wide angle lens.

- Problems associated with PIR sensors
- Area of coverage and fields of a range of sensors

e) Relays encompassing:

- use of NC and NO relays
- show how a transistor “pulls down” current when used as a switch
- wiring diagram for a relay connected to an open collector output on an alarm panel
- typical uses for a relay type output

f) Control panels encompassing:

- features of commonly used panels
- operation of programmable and non-programmable panels
- sound sources used with security alarms
- power sources used with security systems
- panel to base communication systems
- Locks commonly used in the security industry

#### **2.9.41.2 Security systems installation faults**

Evidence shall show an understanding of security systems installation to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Factors effecting system performance
- c) Typical faults, their symptoms and cause.

Note.

Faults include circuit, hardware and software faults

d) Fault diagnosis procedures and testing

Note.

Faults confined to circuit and hardware faults and basic programming faults

e) System adjustments

#### **2.9.42 Audio and video system set up**

Evidence shall show an understanding of setting up audio and video systems to an extent indicated by the following aspects:

- a) Audio components in a system
- b) Video components in a system
- c) Component connection arrangements
- d) Set up options and procedures

#### **2.9.43 Video systems installation**

Evidence shall show an understanding of video systems installation to an extent indicated

by the following aspects:

- a) Installation and set-up of digital TV reception equipment
- b) Installation and set-up of DVD machines
- c) Operating requirements of remote control units

#### **2.9.44 Consumer video equipment**

Evidence shall show an understanding of consumer video equipment to an extent indicated by the following aspects:

- a) Operation principle

Note.

Examples of video equipment are VCRs, DVDs, desktop boxes camcorders and hand held micro controllers

- b) Fault-finding to sub system (functional blocks) level

#### **2.9.45.1 Audio electronics**

Evidence shall show an understanding of audio electronics to an extent indicated by the following aspects:

- a) Interpretation of circuit diagrams of audio amplifiers
- b) Adjustment and testing of the power output stage of an amplifier
- c) Specifications and measurements associated with voltage and power amplifiers
- d) Connections and phasing of equipment
- e) System control circuits

#### **2.9.45.2 Recording and replay apparatus diagnostics**

Evidence shall show an understanding of diagnosing recording and replay apparatus to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Factors effecting system performance
- c) Typical faults, their symptoms and cause.
- d) Fault diagnosis procedures and testing
- e) Sub-system adjustments

#### **2.9.46 Professional audio electronics**

Evidence shall show an understanding of professional audio electronics to an extent indicated by the following aspects:

- a) Complex audio systems used for live sound or theatre application
- b) Connections and phasing of equipment
- c) Optimum signal levels for the acoustic environment
- d) Connection and adjustment of signal processing units
- e) Tuning, adjustment and diagnosis of systems

#### **2.9.47 Loud speakers and microphones**

Evidence shall show an understanding of loud speakers and microphones to an extent

indicated by the following aspects:

- a) Loud speaker construction and applications
- b) Operation of circuits and cross over networks
- c) Optimum layout of speaker systems
- d) Principle and operation of microphones

#### **2.9.48 Digital audio**

Evidence shall show an understanding of digital audio to an extent indicated by the following aspects:

- a) Fundamentals of digital audio systems
- b) Signal processing within the encoding of a system
- c) Error checking techniques in the encoder process
- d) Modulation used in the encoding process
- e) The process for decoding digital audio signals to produce analogue stereo output
- f) Features and operation of compact disk players

#### **2.9.49 Computer monitors**

Evidence shall show an understanding of computer monitors to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Monitor driver software and configuration
- c) Monitor calibration principles
- d) Common faults, their symptoms and cause.
- e) Fault location procedures and testing points
- f) Monitor adjustments

#### **2.9.50 Commercial audio/video systems commissioning process**

Evidence shall show an understanding of commissioning commercial audio/video systems to an extent indicated by the following aspects:

- a) Purpose of commissioning
- b) Commissioning planning and documentation
- c) Initial tests and adjustments
- d) Commissioning procedures

#### **2.9.51 Camcorders**

Evidence shall show an understanding of camcorders to an extent indicated by the following aspects:

- a) Operation, tape standards and formats used in camcorders
- b) Operation of optical transducers and lens systems
- c) Alignment of monochrome camera tubes
- d) Colour separation techniques and single tube colour camera signal processing
- e) Charge coupled device signal processing
- f) Mechanics of camcorders

### **2.9.52 Digital versatile disk processors**

Evidence shall show an understanding of digital versatile disk processors to an extent indicated by the following aspects:

- a) Operating principles, characteristics, features and standards of DVD players
- b) Components and adjustment of DVD players

### **2.9.53 Compact disk players**

Evidence shall show an understanding of compact disk players to an extent indicated by the following aspects:

- a) Characteristics of optical digital recording
- b) Components of CD players
- c) Operation of servo loops
- d) Digital signal processing
- e) System control sections of a CD

### **2.9.54 VCR basic principles**

Evidence shall show an understanding of VCR basic principles to an extent indicated by the following aspects:

- a) Installation and operation of a VCR
- b) Techniques used in magnetic tape recording
- c) Helical scanning process and FM magnetic recording principles
- d) Adjustment and replacement of components within mechanical sections
- e) Luminance signal processing stages
- f) Operation of electronic systems

### **2.9.55 VCR fault finding**

Evidence shall show an understanding of VCR fault finding to an extent indicated by the following aspects:

- a) Faulty component location in the sections of a VCR encompassing:
  - Mechanical components
  - luminance components
  - chroma components
  - servo control sections
  - system control sections
  - timer and display sections
  - power supply sections
  - sound sections
  - RF sections

### **2.9.56 VCR advanced principles**

Evidence shall show an understanding of VCR advanced principles to an extent indicated

by the following aspects:

- a) The operation of the chrominance processing in practical circuits
- b) Control sections operated by microprocessors
- c) The operation of analogue and digital servo systems

#### **2.9.57.1 Introduction to television**

Evidence shall show an understanding of introduction to television to an extent indicated by the following aspects:

- a) Fundamentals of the Australian broadcast television system in block diagram form
- b) Functions of a television camera using block diagrams
- c) Functions of a television receiver using block diagrams
- d) Principles and operations of picture tubes
- e) The principles of the Australian PAL colour television process
- f) Television receiver aerials

#### **2.9.57.2 Television receiver repair basics**

Evidence shall show an understanding of the basics of television receiver repair to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Common faults, their symptoms and cause.
- c) Fault location procedures and testing points
- d) Device adjustments

#### **2.9.58 TV RF signal stages**

Evidence shall show an understanding of TV RF signal stages to an extent indicated by the following aspects:

- a) Block diagrams and specifications for frequency, bandwidth and local or fringe signal levels
- b) VHF, UHF connections, tuner, vision IF, AGC, AFC, inter-carrier sound IF, stereo sound IF, stereo sound decoder
- c) VHF and UHF vision and stereo sound signal frequencies and amplitudes
- d) Specifications of VHF and UHF television, FM radio antennae, polarity of transmitted signals, baluns, diplexers, filters, cable and cable loss, mast head amplifiers, isolation with directional coupling techniques, splitters and combiners, distribution amplifiers, tee off units, signal strength meters and measurements, insertion loss measurements, interface problems and symptoms
- e) VHF/UHF varicap tuner, basic methods of band switching, basic methods of fine frequency tuning by varicaps
- f) Receiver tuner IF specifications
- g) Basics of saw filter, synchronous AM and FM demodulators, AGC response grams, gated displayed amplified AGC with tuner delay, optimum inter-carrier sound IF
- h) Measurement techniques for RF and IF sensitivity, AGC dynamic range, AFC range, stage gain
- i) Specifications of stereo sound system, sub-carrier frequencies modulation levels, amplitudes, bandwidth

### **2.9.59 Closed circuit televisions**

Evidence shall show an understanding of closed circuit televisions to an extent indicated by the following aspects:

- a) Application CCTV systems encompassing:
    - Sub-system components (i.e. functional blocks) and their function
  - b) Television principles encompassing:
    - Sub-system components (i.e. functional blocks) and their function
    - Video signals
  - c) CCTV cameras encompassing:
    - Types of cameras
    - Sub-system components (i.e. functional blocks) and their operating parameters
  - d) Camera lens encompassing:
    - Types of lenses and their characteristics
    - Application of various types
    - Setting up
  - e) Monitors and recording devices
    - Types and application
    - Analogue and digital recording devices and their application
  - f) Installation and mounting encompassing:
    - Consideration in locating and mounting CCTV camera and auxiliary equipment
- Note.
1. Examples are need for sealed and heated housings, IP rating required, methods for overcoming earth (ground) loops, need for lightning protection.
  2. Examples of auxiliary equipment are in-line video amplifiers/ equalizers and video distribution amplifiers

### **2.9.60 Electronic security systems fundamentals**

Evidence shall show an understanding of electronic security systems to an extent indicated by the following aspects:

- a) Type of detectors and their operating principles
- b) Relay connections to an open collector output on an alarm panel
- c) Design principles of a security system
- d) Impact of building structures on system design
- e) Types of security panels and their communication system
- f) Use of CCTV
- g) Locking devices
- h) Security lighting

### **2.9.61 Advanced electronic security systems**

Evidence shall show an understanding of advanced electronic security systems to an extent indicated by the following aspects:

- a) Connection of input and output devices to detectors and control panels
- b) Procedures to perform hardware and software upgrades

- c) Types of code pads and commands required to operate the system

#### **2.9.62 Security video monitoring and recording**

Evidence shall show an understanding of security video monitoring and recording to an extent indicated by the following aspects:

- a) Principles of television systems
- b) Multiplexing techniques
- c) Multiplex display and recording of CCTV
- d) Digital encoding techniques
- e) Video distribution and transmission techniques
- f) Microprocessor based CCTV systems
- g) Factors affecting picture quality

#### **2.9.63 Direct current power supplies**

Evidence shall show an understanding of DC power supplies to an extent indicated by the following aspects:

- a) Operating principles and application of DC power supplies
- b) Output waveforms of various rectification circuits
- c) Ripple an output DC voltage for capacitive power supply filter circuits
- d) Operation of a Zener diode shunt voltage regulator
- e) Selection of 3 terminal regulators from data sheets

#### **2.9.64 Application of electronic devices**

Evidence shall show an understanding of application of electronic devices to an extent indicated by the following aspects:

- a) Characteristics of discrete components
- b) Amplify types and characteristics
- c) Interface devices and their applications
- d) Comparable devices and their applications

#### **2.9.65 Regulated power supplies**

Evidence shall show an understanding of regulated power supplies to an extent indicated by the following aspects:

- a) Purpose and benefits of different types of regulated power supplies
- b) Operation of different types of regulated power supplies
- c) Voltage current waveforms at different points within a power supply
- d) Regulator types operation and characteristics
- e) Linear regulators using integrated circuits

#### **2.9.66 Switching power supplies**

Evidence shall show an understanding of switching power supplies to an extent indicated by the following aspects:

- a) Operation of inverter and inverter circuits
- b) Characteristics of saturable core solid state inverter circuits, transformer inverter/converter circuits and single transistor inverter/converter circuits

### **2.9.67 Feedback filters and oscillators**

Evidence shall show an understanding of feedback filters and oscillators to an extent indicated by the following aspects:

- a) Operation of open and closed looped systems and differences between positive and negative feedback
- b) Characteristics of a voltage amplifier when negative feedback is applied
- c) Estimated measure the gain of an amplifier
- d) Purpose of filters in an electronic system
- e) Common types of filters, their characteristics and application
- f) Operation of oscillators and electronic systems
- g) Purpose of oscillators
- h) Conditions sustained for oscillation
- i) Operation of phase shift oscillators
- j) The operation and characteristics of a Colpitts oscillator
- k) Conditions that causes instability in amplifier circuits

### **2.9.68 Filters and resonance**

Evidence shall show an understanding of filters and resonance to an extent indicated by the following aspects:

- a) Conditions that create resonance in electronic circuits
- b) Circuit conditions and features of a parallel resonant circuit
- c) Circuit conditions for RLC circuits operating above and below resonant frequency
- d) The relationship between Q-bandwidth and resonant frequency
- e) Capacitive/resistive filters principles and characteristics of operation
- f) Characteristics and operation of low pass filters, band stop filters and band pass filters

### **2.9.69 Digital subsystems**

Evidence shall show an understanding of digital subsystems to an extent indicated by the following aspects:

- a) Digital to analogue conversion encompassing:
  - typical applications
  - D/A performance characteristics
  - D/A converter circuitry
  - D/A converter specifications

Note.  
Examples are resolution, accuracy, offset error, setting time, monotonicity.

  - integrated circuit D/A converter
- b) Analogue to digital conversion encompassing:
  - typical applications
  - A/D performance characteristics

- types of A/D converters (ADC)

Note.

Examples are . digital ramp ADC, successive-approximation ADC, simultaneous (flash) ADC, dual slope ADC.

- • integrated circuit A/D converter

c) Interface chips and techniques encompassing:

- logic interface circuits

Note.

Examples are level translations, driving a load (sink and source) from a logic circuit, transistor switches, relays, opto input and output isolation, driver IC's.

- sensor interfacing

d) Programmable logic devices encompassing:

- applications

- types

Note.

Examples are programmable logic array (PLA), programmable array logic (PAL), and erasable PLDs,

- circuit architecture and operation

- programming requirements

### 2.9.70 Automatic data capture

Evidence shall show an understanding of automatic data capture to an extent indicated by the following aspects:

- a) Forms of automatic data capture, advantages and disadvantages
- b) Selection of barcodes from standards
- c) Suitability of automatic data capture equipment including readers, printers, ancillary devices and radio frequency for various applications
- d) Interfacing issues between systems involving different hardware and software
- e) Functional design and construction of a simple system

#### 2.9.71.1 Biometric devices

Evidence shall show an understanding of biometric devices to an extent indicated by the following aspects:

- a) Biometrics techniques and processes including definitions, terminology, advantages, disadvantages and applications

Note.

Includes basic principles of database design, software techniques, classifier combination, feature extraction, feature enhancement, chain code methods, image analysis, biometric transforms, matching techniques, verification and identification, biometric tools, statistical measures of biometrics

- b) Biometric device tools, software and testing techniques
- c) Physical interaction with biometric devices including operation and installation of biometric devices examples are iris scanners, hand scanners voice recognition apparatus, facial recognition devices and like equipment
- d) Legal aspects of biometrics
  - Australian laws impacting on biometrics security and privacy legislation.
  - Australian standards

### 2.9.71.2 Biometrics Equipment Techniques and Applications

Evidence shall show an understanding of biometrics equipment techniques and applications to an extent indicated by the following aspects:

a) Technology applications used in forensics, genetics, civil and commercial environments and government departments for verification of identities, encompassing:

- Fingerprint matching
- Palm Print
- Hand Geometry
- Face Verification
- Iris Recognition
- Retina Scan

Note.

Examples of biometrics equipment technology used including scanning and digitizing of samples, enhancement of captured data, feature extraction, classification, matching, searching and manual verification

b) Technical principles, parameters, and processes underpinning each of the above technologies in identity recognition

c) Typical selection, evaluation and testing criterion and methods of biometrics equipment, encompassing:

- comparative features of selection, evaluation and testing methods of various classes of equipment
- vendor claims, product suitability and product specifications

### 2.9.71.3 Biometric Systems Techniques and Applications

Evidence shall show an understanding of biometric systems techniques and applications to an extent indicated by the following aspects:

a) Complex biometric systems technology applications used in forensics, genetics, civil and commercial environments, government departments and defence for verification of identities, encompassing:

- Voice Recognition
- Speech Recognition
- Handwriting Analysis
- Signature Verification
- DNA Technology
- Multi-biometrics

Note.

Examples of biometrics system technologies used including voice recognition interfacing components and hardware, speech extraction and evaluate speech recognition system performance, handwriting digitizers tablets, hardware and software used in signature verification, DNA technology in biometric systems,

b) Technical principles, parameters, and processes underpinning each biometric system technology in identity and verification recognition

c) Typical selection, evaluation and testing criterion and methods of biometrics systems, encompassing:

- comparative features of selection, evaluation and testing methods of various biometrics systems

- vendor claims, product suitability and product specifications

#### **2.9.71.4 Biometrics and Security**

Evidence shall show an understanding of biometric and security to an extent indicated by the following aspects:

- a) Compliance requirements for implementing security on personal computers and computer networks
- b) Compliance requirements for securing voice over the internet
- c) Compliance requirements for assuring IT network security and capital planning measures encompassing:
  - security risks versus investment risks,
  - investment management life cycle
  - capital management and investment control
  - alternatives and budget analyses of IT security
- d) Security implementation encompassing:
  - biometrics in law and relationship with legislation
  - trusted networks, cryptography and data security characteristics
  - advanced authentication, digital certificates and digital signatures
  - cost comparison and evaluative analysis
- e) Laws, standards and compliance guidelines encompassing:
  - international
  - national
  - local
  - codes
  - institutional
- f) Preparing and selecting a vendor encompassing:
  - client needs analysis
  - project parameters according to business needs analysis
  - project goals and criteria
  - tender process management
  - project monitoring and evaluation
- g) Deployment principles for rollout of Biometrics system(s) encompassing:
  - scalability and manageability
  - trailing and testing
  - commissioning
  - compliance documentation

#### **2.9.72 Custom electronic installations, testing and verification methods**

Evidence shall show an understanding of testing and verifying compliance of custom electronic installations to an extent indicated by the following aspects:

- a) Compliance and quality control testing and verification requirements.
- b) Testing techniques.
- c) Features of custom electronics installations that can be visually inspected

### **2.9.73 Operational concepts of business machines**

Evidence shall show an understanding of operational concepts of business machines to an extent indicated by the following aspects:

- a) Purpose and function of common business machines
- b) Operation, adjustment and maintenance of photocopiers, facsimile machines, printers and PCs
- c) The electronic communications and connections between business machines
- d) Hazardous materials used in the office and handling procedures

### **2.9.74.1 Electro-mechanics of business machines**

Evidence shall show an understanding of electro-mechanics of business machines to an extent indicated by the following aspects:

- a) The operating features of electric motors, relays and solenoids, clutches and tachometers
- b) Function and operation of feed mechanisms, drive-trains and cleaning processors

### **2.9.74.2 Business machine transducers**

Evidence shall show an understanding of business machine transducers to an extent indicated by the following aspects:

a) Function of transducers encompassing:

- Linear position & velocity
- Angular position measurement
- Angular velocity measurement
- Temperature sensors
- Humidity sensors
- Current sensors
- Piezo sensors

b) Temperature sensors types, operating principles and applications

Note.

Examples are thermocouples, resistance temperature detectors (RTD), thermistors, bimetal temperature sensors and the like.

c) Optoelectronics device types, operating principles and applications

Note.

Examples are. photo resistors, photodiodes, phototransistors, LASCR, photovoltaic devices, optocouplers, lasers and the like.

### **2.9.74.3 Photocopier operating principles**

Evidence shall show an understanding of photocopier operating principles to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) operating parameters
- b) Analogue copying processes encompassing:
  - image scanning process
  - development process

- transfer process
  - cleaning process
  - fusing process
  - process control/compensation techniques
- c) Digital copying processes encompassing:
- image scanning process
  - image capture process
  - image storage techniques
  - image manipulation process
- d) Paper feed and transportation encompassing:
- Paper types
  - Paper handling
  - Methods of paper feed
  - Paper transportation
- e) Maintenance procedures encompassing:
- adjustment for correct operation
  - Replacement of consumable items
  - Cleaning procedures

#### **2.9.75.1 High volume business machine functions and faults**

Evidence shall show an understanding of high volume business machine functions and faults to an extent indicated by the following aspects:

- a) The operating features of electric motors, relays and solenoids, clutches and tachometers
- b) Function and operation of feed mechanisms, drive-trains and cleaning processors
- c) Input accessories, their function and operating principle encompassing:
- paper trays
  - high capacity bins
  - document feeders
  - duplex unit
  - manual bypass
  - coin boxes
  - card readers
  - raster image processing unit
- d) Output accessories, their function and operating principle encompassing:
- sorters
  - staplers
  - collators
  - folders
  - stackers

#### **2.9.75.2 Colour photocopiers operating principles**

Evidence shall show an understanding of colour photocopier operating principles to an

extent indicated by the following aspects:

- a) Principles of colour and colour separation encompassing:
  - Effects of light on the eye
  - Colour principles
  - Colour separation
  - Colour mixing processes
  - Colour Wheel
- b) Colour separation in colour photocopying encompassing:
  - Three scan process
  - Four scan process
  - Under colour removal
- c) Principles of colour photocopying
  - Reflected light paths
  - Block diagrams of photocopiers
  - Principles of operation
- d) Scanning processes of colour photocopiers encompassing:
  - CCD
  - Pre amps
  - Auto gain
  - Image Processing Unit
  - Laser unit
  - Exposure processes
- e) Printing processes of colour photocopiers encompassing:
  - Laser diode unit
  - Polygon mirrors
  - Laser synchronising and detector encompassing:
    - Cylindrical lens
- f) Routine maintenance and servicing encompassing:
  - Optics
  - Paper feeds
  - Developer unit
  - Drum unit
  - Belts and rollers
  - Fusing unit

### **2.9.75.3 Facsimile machine operating principles**

Evidence shall show an understanding of facsimile machine operating principles to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) operating parameters encompassing:
  - CCITT standards
  - analog and digital transmissions
  - transmission process

- phases of facsimile calls
- b) Scanning operations encompassing:
  - single photosensor
  - CCD Operations
  - area image sensors
  - lighting systems
  - optical systems
- c) Signal processing encompassing:
  - picture reduction
  - modems
- d) Printing processes encompassing:
  - thermal
  - plain paper
  - carbon transfer
  - ink jet
- e) Dialling parameters encompassing:
  - pulse (decadic) dialling
  - DTMF
  - manual dial
  - blind dial, line and dial detect
  - redial and listen to dial
- f) Coding systems encompassing:
  - data compression
  - Modified Hauffman (MH) systems
  - Modified Read (MR) systems
  - Modified Modified Read (MMR) systems
  - “K” factor
  - Error Correction Modes (ECM)
- g) Operational principles encompassing:
  - transmission
  - reception
  - copying
- h) Installation, operation, maintenance and servicing procedures encompassing:
  - disassembly and assembly
  - consumable replacement
  - cleaning
  - fault identification
  - machine faults
  - line faults
- i) Facsimile services encompassing:
  - faxstream
  - duet

### 2.9.76 Microwave heating

Evidence shall show an understanding of microwave heating to an extent indicated by the following aspects:

- a) Propagation of electromagnetic waves through the atmosphere, microwave frequency bands
- b) Microwave heating devices encompassing:
  - Components
  - Operating parameters and constraints
  - Measurements, test equipment and testing techniques
- c) EMI/EMC, generation, suppression and reduction.

### 2.9.77 Electronic components and system, industrial applications

Evidence shall show an understanding of industrial applications of electronic components and systems to an extent indicated by the following aspects:

- a) Semiconductor devices encompassing:
  - Australian Standard symbols for each device.  
Note: The devices should include P-N junction diodes, schottky rectifier diodes, zener diodes, LED, BJT and MOSFET. transistors (switching), SCRs, triacs, diacs, 3-terminal regulators.
  - basic operating principle for each device.
  - typical applications for each device.
- b) Single and three-phase rectifiers, filters and voltage regulators encompassing:
  - Australian Standard circuit symbol for each rectifier/filter/three terminal voltage regulator type.
  - operating principles of each rectifier/filter/regulator circuit.
  - input and output voltage values and waveforms for each circuit.
- c) Electronic Inverters encompassing:
  - block diagram representation of an inverter.
  - operating principles of an inverter.
  - common types of inverters.
  - safety precautions for low voltage inverter systems.
- d) Power control devices and circuits encompassing:
  - Australian Standard symbols for each device.
  - *Note:* The devices should include SCRs, triacs, GTOs, diacs and UJTs.
  - basic operating principle for each device.
  - typical applications for each device.
  - *Note:* The applications should include solid state relays, leading and trailing edge dimmers, heating controls.
- e) Programmable Relays encompassing:
  - advantages of programmable relays over electromagnetic relay circuit control.
  - applications for programmable relays.
  - block diagram representation of a programmable relays and basic operating principles.
  - input and output connections to a programmable relays and output types.

- basic programming consisting of inputs, outputs and timers.
- f) Typical applications of devices  
g) Common faults and their symptom

### **2.9.78 Common security scenarios and solutions**

Evidence shall show an understanding of common security scenarios and solutions to an extent indicated by the following aspects:

- a) Alternative access arrangement
- b) Intrusion protection and monitoring options
- c) Available technologies
- d) Integration with other systems

#### **2.9.79.1 Fire protection technologies**

Evidence shall show an understanding of fire protection technologies to an extent indicated by the following aspects:

- a) Life and safety concerns for fire protection.
- b) Basic principles of combustion
- c) Bi-products of combustion that can be detected
- d) Basic principles of fire behaviour within and enclosure
- e) Types of fire protection systems and the difference between automatic and passive systems and wet and dry systems.

#### **2.9.79.2 Fire protection systems, commissioning process**

Evidence shall show an understanding of the commissioning process of fire protection systems to an extent indicated by the following aspects:

- a) Purpose of commissioning
- b) Commissioning planning and documentation
- c) Initial tests and adjustments
- d) Commissioning procedures

#### **2.9.79.3 Fire protection systems faults**

Evidence shall show an understanding of locating faults in fire protection systems to an extent indicated by the following aspects:

- a) Sub-system components (ie functional blocks) and their operating parameters
- b) Factors effecting system performance
- c) Typical faults, their symptoms and cause.
- d) Fault diagnosis procedures and testing
- e) Sub-system adjustments

### **2.9.80 Video and display set up**

Evidence shall show an understanding of video and display set up to an extent indicated by the following aspects:

a) Projectors encompassing:

- Aspect ratio
- Screen size
- Orientation
- Throw distance, vertical elevation and horizontal orientation

b) Direct view monitors adjustments

### **2.9.81 Audio/video control equipment**

Evidence shall show an understanding of audio/video control equipment to an extent indicated by the following aspects:

- a) Types of control devices and their operating principles
- b) Control equipment arrangement in an audio/video system

### **2.9.82 Introduction to optics**

Evidence shall show an understanding of optics to an extent indicated by the following aspects:

- a) Optical concepts and parameters
- b) Applications of optical technology
- c) Optical communications encompassing:
  - Optical fibre cable structures and applications
  - Single and multi mode
  - Transmitter and receiver components
- d) Optical fibre cable termination practices
- e) Predicted applications

### **2.9.83 General electronic apparatus repair basics**

Evidence shall show an understanding of general electronic apparatus repair basics to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Common faults, their symptoms and cause.
- c) Fault location procedures and testing points
- d) Device adjustments

Note.

Examples of general electronic apparatus are data capture devices, security panels, fire protection panels, industrial control apparatus, instrumentation electronics and any apparatus not specifically covered under other clauses but for which there is a service manual and circuit diagrams.

### **2.9.84 Advanced analogue electronics**

Evidence shall show an understanding of advanced analogue electronics to an extent indicated by the following aspects:

- a) Differential amplifiers of suitable characteristics to meet system objective encompassing:
  - differential gain, common mode rejection ratio and the required CMRR
  - variable gain input stage

- connections for an instrumentation amplifier to meet given objectives.
- b) Audio frequency integrator working to given specifications encompassing:
- ideal integrator
  - practical difficulty with the ideal circuit
  - common applications of the integrator.
- c) Operational amplifier circuits encompassing:
- use of d.c. offset and capacitive blocking and Norton amplifiers powered by a single supply
  - operation of single-supply inverting and noninverting amplifiers employing DC offset bias at the input and blocking capacitors
  - operation of a high input resistance unity gain
  - circuit symbol of the Norton (input current difference) amplifier
  - areas of use for single-supply amplifiers.
- d) Comparator circuits (open loop, limited swing and hysteresis) using operational amplifiers encompassing:
- ideal op-amp comparator
  - typical uses of the comparator.
  - comparators with limited (i) negative swing and (ii) both positive negative swing
  - hysteresis comparator with positive resistor divider feedback and calculate the input switching voltages.
  - desirable properties of an operational amplifier for use as comparator and the characteristics of comparator op amps.
- e) Amplifiers with given piecewise linear transfer characteristics
- f) Operation and building precision of half-wave and fullwave rectifiers encompassing:
- precision two-diode half-wave rectifier
  - typical applications of precision rectifiers.
- g) Operation of and build a sine - triangle – square function generator encompassing:
- block diagram of a sine-triangle-square signal generator using an integrator, comparator and sine-wave shaper.
  - waveforms at various points in the circuit.
  - frequency range and setting of frequency changes.
  - function generators and oscillators.
- h) Audio-frequency low-pass, high-pass and band-pass filters to meet given objectives encompassing:
- frequency response of low-pass, high-pass, low-Q band-pass, high-Q bandpass, notch and all-pass filters and define pass-band, stop-band and rate of roll-off.
  - main features in the amplitude and phase plots of Butterworth, Chebyshev, Causer-Elliptic and Bessel filter responses.
  - pros and cons of active and passive filters.
  - non-unity gain Sallen-Key low-pass filter.
  - Types of active filters available in IC form:
- Note.  
Examples are Variable filter, Switched Capacitor Filters and digital (sampled data) filters.
- Low-Q (ie cascade of lowpass and high-pass) and/or narrow bandpass filters.

### 2.9.85 Advanced power amplifiers

Evidence shall show an understanding of advanced power amplifiers to an extent indicated by the following aspects:

- a) Analysing the performance of power amplifiers encompassing:
  - Power amps.
  - minimum power, voltage and current rating of an output transistor.
  - aspects of heat transfer related to heat sinking.
  - Common forms of distortion encountered in power amplifiers.
  - techniques for overcoming common forms of distortion.
- b) Classes of power amplifiers and indicate typical maximum efficiencies for each class encompassing:
  - conduction, angle, output power and efficiency of a power amp.
  - typical and/or maximum efficiencies of each class of power Amp.
  - d.c and/or a.c load line,
  - output power and efficiency of a large signal amplifier
- c) Operation of each class and type of power amplifier circuit encompassing:
  - load line operation.
  - Class A – direct, RC, transformer coupled. Class B – Complementary symmetry, drivers, single supply/duel supply. Class C and Class D.
  - measure the characteristics of a fully integrated operational power Amplifiers.

### 2.9.86 Audio system advanced diagnostic techniques

Evidence shall show an understanding of advanced audio system diagnostic techniques to an extent indicated by the following aspects:

- a) Perception and measurement of sound
- b) Acoustics and equalisation
- c) Sound recording and reproduction technologies
- d) Audio component testing, measurements and adjustments

Note.

Examples of tests are frequency response for given loads, small signal test, distortion measurement, noise measurement, frequency versus distortion, intermodulation spectrum, spectral-decay plots, acoustic cross-over, anechoic response, lateral and vertical response and the like.

### 2.9.87 Photonic principles and applications

Evidence shall show an understanding of photonic principles and applications to an extent indicated by the following aspects:

- a) Photonic principles
  - Measurements on the optical devices that are used in a basic fibre optic link
  - Optical devices making up an optical fibre link
  - The interconnection of optical devices that make up a one way optical fibre link
  - The construction of an LED optical light source
  - The electrical and optical parameters of LASERS
  - LED and LASER light sources

- PN photodiodes and phototransistors
  - The electrical and optical parameter
  - The basic capability of optical technology involving energy transfer, communications, sensing, miniaturisation and signal processing
- b) The environmental advantages and impacts of optical technology
- The nature and importance of innovation
  - The triple bottom line of business: economic, social and environmental as it relates to optical technology
  - Scenario development using a variety of expressive methods to explore alternatives.
  - Information networking
  - Medical applications.
  - Teleworking applications.
  - Education applications
  - Opportunities in the optical industry in Australia
  - Innovations in business using optical technology
  - Innovations in the provision of infrastructure in Australia
- c) Basic geometric optics
- d) Introduction to photonic components
- e) The basic concepts of optical transmission encompassing:
- 'Atmospheric' and 'guided' optical transmission systems
  - Fibre 'guided' systems compared to 'atmospheric' systems
- f) Photonic components and component technologies encompassing:
- Differentiate between 'passive' and 'active' photonic components
  - Identify and describe optical component technologies
- g) Photonic components and their roles in photonic devices encompassing:
- Operational concepts of components and devices,
  - Active verses passive devices
  - Available photonic devices and their constituent components
  - Photonic device operation
- h) Operating principles of optical couplers and their characteristics encompassing:
- Optical couplers.
  - Loss
  - Number of ports
  - Directionality
  - Wavelength selectivity
  - 'T' and 'Y' couplers
  - '1-to-N' or 'Tree' couplers
  - Star couplers
  - Wavelength selective couplers
  - Bulk and micro-optic technologies
  - Fused fibre technology
  - Planar waveguides technology

- Fibre-grating technology
- i) Components for WDM systems encompassing:
- Passive and active components for WDM systems
  - Filters (Interference and Absorption)
  - Bulk optical gratings
  - Arrayed waveguides
  - Attenuators
  - Line and Band filters
  - Equalising filters
  - Fixed and Tunable filters
  - Optical Isolators (including Faraday Effect)
  - Dispersion compensators
  - Multiplexers or combiners
  - Demultiplexers or splitters
  - Routers
  - Add/Drop multiplexers
  - Interconnection techniques used between optical components used in each optical
  - Devices
- j) Operational principles of key photonic devices encompassing:
- The difference between multimode and single mode fibre,
  - Attenuation,
  - Dispersion
  - Spontaneous and stimulated emission of light

### **2.9.88 Principles of signal conditioning**

Evidence shall show an understanding of principles of signal conditioning to an extent indicated by the following aspects:

- a) Sensors and transducers: static and dynamic characteristics
- b) Sensor types encompassing:
- strain and force
  - thermocouples
  - displacement, location, proximity
  - motion
  - light and radiation
- c) Signal amplification techniques encompassing:
- Isolation and filtering

### **2.9.89 Analogue integrated circuits**

Evidence shall show an understanding of analogue integrated circuits to an extent indicated by the following aspects:

- a) Power ICs
- b) PLL circuits

- c) Timer circuits
- d) Function and waveform generators
- e) Op amp pulse oscillators

### **2.9.90 RF amplifiers**

Evidence shall show an understanding of RF amplifiers to an extent indicated by the following aspects:

- a) HF response of amplifiers
- b) Gain levelling techniques
- c) Tuned amplifiers
- d) Double-tuned circuits
- e) Z-matching
- f) RF Power amplifiers
- g) Stripline circuit techniques

### **2.9.91 Printed circuit board design techniques**

Evidence shall show an understanding of printed circuit board design techniques to an extent indicated by the following aspects:

- a) Printed circuit board materials and processes
- b) Factors influencing design
- c) Design tools and software
- d) Design standards

## 2.10 Electronic communications technology

### 2.10.1.1 Electronic communications, principles

Evidence shall show an understanding of principles of an electronic communications system to an extent indicated by the following aspects:

- a) Requirements of a basic communications system
- b) Antennae and electromagnetic wave propagation
- c) Reason for modulation
- d) Amplitude and frequency modulation, difference, advantages and disadvantages
- e) Single conversion super hydrodynamic receivers
- f) Specialist receiver circuits

### 2.10.1.2 Electronic signals and systems

Evidence shall show an understanding of electronic signals and system to an extent indicated by the following aspects:

- a) Signal types and their application
- b) Functional blocks in electronic communication systems
- c) Basic methods of signal generation, conditioning and transmission

### 2.10.1.3 Electronic communications, technologies

Evidence shall show an understanding of technologies in electronic communications to an extent indicated by the following aspects:

- a) Concepts of a communication system encompassing:
  - function of a block.
  - radio wave.
  - frequency bands of a radio wave in free space.
  - signal transmission media

Note.  
Examples are metal line, radio terrestrial to terrestrial, radio terrestrial to satellite to terrestrial, wave guide, optical fibre and the like

  - effects of noise on communication system output.
  - internal and external sources of noise.
- b) Characteristics of signals in both the time and frequency domains encompassing:
  - signals forms in time and frequency domain:
  - periodic complex waveforms
  - Fourier analysis
- c) Modulated signals in the time and frequency domain encompassing:
  - process of amplitude modulation (AM).
  - bandwidth of an AM
  - modulation index.
  - total power in an AM wave for one or more modulating tones
  - power rate of AM transmitters

- modulation index using a CRO.
  - Amplitude modulator circuits.
- d) Demodulation of signals and baseband signal encompassing:
- diode detector.
  - operation of an AM demodulator
  - non-linear mixing and filtering or frequency down conversion
  - single sideband (SSB).
  - baseband output frequency
  - Frequency Modulation (FM)
  - limiting of FM signals and noise suppression.
- e) Time and frequency division multiplexing encompassing:
- frequency division multiplexing (FDM).
  - hierarchy of FDM as applied to telephony and broadcast stereo.
  - time division multiplexing (TDM).
  - hierarchy of TDM.
- f) Concepts and characteristics of a superheterodyne receiver system encompassing:
- crystal set circuit operation.
  - TRF receiver circuit.
  - disadvantages of a TRF receiver.
  - block diagram of a single conversion superheterodyne receiver.
  - shortcomings of the TRF
- g) Operation of transmitters encompassing:
- Amplitude Modulation (AM).
  - modulation technique (high or low level) and function of each block
  - single sideband (SSB) and function of each block.
  - frequency modulation (FM) and function of each block
- h) Concepts of digital encoding of baseband signals encompassing:
- analog signals quantised and digital form.
  - sampling analogue signals.
  - pulse-code modulation (PCM).
  - quantisation as applied to PCM.
  - quantisation noise as applied to PCM.
  - companding of PCM signals.
  - PCM encoding.
  - advantages that digital signals such as PCM
- i) Sources and effects of noise in a communication system encompassing:
- S/N ratio in communication systems.
  - noise figure, noise factor and noise equivalent temperature

### 2.10.2 Electronic communications, transmission principles

Evidence shall show an understanding of transmission principles to an extent indicated by the following aspects:

- a) Principles and operation of transmitters
- b) Types of transmitters, their features and characteristics
- c) Tuning, adjusting and testing.

### **2.10.3 Electronic communications, modulation**

Evidence shall show an understanding of modulation in electronic communications to an extent indicated by the following aspects:

- a) Amplitude modulation including concepts, phasor representation, envelope, depth, power in sidebands, over modulation and splatter
- b) Sideband modulation and de-modulation techniques including single, double and vestigial types and frequency representation
- c) Frequency and phase modulation

### **2.10.4 Electronic communications, modulation circuits**

Evidence shall show an understanding of modulation to an extent indicated by the following aspects:

- a) Amplitude modulation concepts

Note.

Examples include basic amplitude modulation fundamentals, phasor representation of carrier and sidebands, phase on modulation envelope, index and percentage modulation depth, power in carrier and sidebands, over modulation and "splatter"

- b) Sideband modulation terminology and techniques.

Note.

Examples include double-sideband (DSB), single-sideband (SSB), vestigial-sideband (VSB), frequency domain representation, double-sideband signal (DSB), single-sideband signal (SSB), demodulation requirements for DSB and SSB

- c) Frequency and phase modulation

Note.

Examples include, time and frequency domain representation, amplitude and frequency distribution of sidebands, frequency modulation (FM) production, phase modulation (PM) production, equivalent FM and PM – audio processing

- d) NBPM Armstrong method of producing (phasor description)

### **2.10.5 Electronic communications, receivers**

Evidence shall show an understanding of receivers to an extent indicated by the following aspects:

- a) Receiver principles, types, construction and applications
- b) Polarisation
- c) Mixers
- d) Intermediate frequency amplification
- e) Demodulation
- f) Receiver systems, types and characteristics

### **2.10.6 Electronic communications, transmitters**

Evidence shall show an understanding of transmitters to an extent indicated by the following aspects:

- a) Transmitter fundamentals
- b) Transmitter configuration
- c) Oscillators and oscillator circuits
- d) Frequency synthesisers
- e) Amplifier types and circuits
- f) Impedance matching networks
- g) Typical transmitter circuits

### **2.10.7 Electronic communications, digital techniques**

Evidence shall show an understanding of digital communication techniques to an extent indicated by the following aspects:

- a) Data rates
- b) Current data communications standards
- c) Modulation schemes used in digital transmission
- d) Power levels and interference
- e) Error handling
- f) Applications like for example: USB, Ethernet, ADSL and BDSL, or any other current applications

### **2.10.8 Electronic communications, transmission lines**

Evidence shall show an understanding of transmission lines to an extent indicated by the following aspects:

- a) Time domain reflectometry measurements
- b) Radio frequency characteristics of transmission lines
- c) Losses in transmission lines
- d) Radiation characteristics of antennae
- e) Directional antennae
- f) Antennae matching
- g) UHF and microwave antennae

### **2.10.9 Electronic communications, antennas and wave propagation**

Evidence shall show an understanding of basic antenna and antennae systems and wave propagation to an extent indicated by the following aspects:

- a) Antenna fundamentals

Note.

Examples include and the characteristics of radio waves, antenna operation, antenna reciprocity and the basic antenna.

- b) Antenna types, feature and characteristics encompassing:

- Dipole antennas and characteristics

Note.

Examples include radiation resistance, dipole length, antenna resistance, antenna Q and bandwidth, conical antennas, dipole polarisation, radiation patterns and directivity, antenna gain and folded dipoles

- Marconi ground-plane vertical antenna features and characteristics

Note.

Examples include radiation pattern, ground plane radials and counterpoise, radiation resistance, antenna length and directivity,

- UHF and microwave antennas
- Relationship between directivity and gain
- Antenna arrays

Note.

Examples include parasitic arrays and driven arrays

- Impedance matching

c) Radio wave propagation characteristics

Note.

Examples include optical characteristic, propagation through space

d) Calculation of received power

e) Antenna selection and location

f) Transmission lines

### 2.10.10 Electronic communications, microwave

Evidence shall show an understanding of microwave communications to an extent indicated by the following aspects:

- a) Propagation of electromagnetic waves through the atmosphere, transmission lines and waveguides including characteristic impedance, impedance matching, standing waves, microwave frequency bands
- b) Microwave device parameters involving wavelength, phase, VSWR, impedance matching, circuit parameters, amplifiers, transmission, reception, oscillation, noise figure, noise temperature
- c) Microwave devices and components
- d) Microwave operational constraints and operating parameters such as power, bandwidth, gain, efficiency, operational life, electrical parameters, stability, cooling, size, testing and device selection
- e) Microwave measurements, test equipment and testing techniques
- f) EMI/EMC, generation, suppression and reduction

### 2.10.11 Electronic communications, satellite

Evidence shall show an understanding of satellite communications systems to an extent indicated by the following aspects:

- a) Types of satellite systems and sub-systems
- b) Earth station locality and antenna parameters
- c) Specifications for an down link communications
- d) Base band signalling processes
- e) Modulation and system access

### **2.10.12 Electronic communications, optical methods**

Evidence shall show an understanding of optic methods of communication to an extent indicated by the following aspects:

- a) Optical principles
- b) Optical fibre cable principles, types construction and applications
- c) Optical transmitters, detectors and receivers
- d) Calculation of transmission losses in fibre optical cables and connectors

### **2.10.13 Television and video reception**

Evidence shall show an understanding of reception signals and decoding to an extent indicated by the following aspects:

- a) Broadcast systems
- b) Basic operation of a TV cameras
- c) Basic operation of a TV receiver including tubes and displays and operating components
- d) Reception aerials and arrays
- e) Operation of a video cassette recorder including tape recording, helical scanning, mechanical principles and adjustments, electronic principles and adjustments, servo control loops

### **2.10.14 TV antenna systems**

Evidence shall show an understanding of TV antenna systems to an extent indicated by the following aspects:

- a) The common difficulties associated with TV receptions
- b) Operating characteristics of common types of TV receiving antennas
- c) Selection of coaxial cable
- d) Multiple outlet TV aerial systems
- e) Operation of satellite receiving systems
- f) Performance testing and fault-finding on multiple outlet antenna systems

### **2.10.15 Antenna installation and servicing**

Evidence shall show an understanding of antenna installation and servicing to an extent indicated by the following aspects:

- a) Propagation of radio waves from a transmitter to a receiver
- b) Characteristics of antenna systems
- c) Selection of antennae systems for various applications
- d) Installation techniques for antennae to receiver and antennae to transmitter transmission and distribution systems

### **2.10.16 Transmission lines and antennae**

Evidence shall show an understanding of transmission lines and antennae to an extent indicated by the following aspects:

- a) Reflectometry minimum and maximum voltage and current values on a transmission line

carrying an RF signal

- b) Transmission line loss measured in decibels
- c) EH field directions in relation to antenna elements
- d) Differences between hertz and Marconi antennas
- e) Principles for microwave antennas used for terrestrial and satellite transmissions

#### **2.10.17 Electronic communications, multiplexing and de multiplexing**

Evidence shall show an understanding of multiplexing and de multiplexing to an extent indicated by the following aspects:

- a) Coding schemes (line coding, error coding, bit rate reduction)
- b) Multiplexing schemes (MPEG1&2)
- c) Spread spectrum (CDMA, COFDM)

#### **2.10.18 Electronic communications, microwave antennas and wave guide fundamentals**

Evidence shall show an understanding of microwave antennas and wave guides to an extent indicated by the following aspects:

- a) Antenna and wave guide principles and components
- b) Installation techniques
- c) Setting up techniques

#### **2.10.19 Electronic communications, commissioning process**

Evidence shall show an understanding of commissioning electronic communication systems to an extent indicated by the following aspects:

- a) Purpose of commissioning
- b) Commissioning planning and documentation
- c) Initial tests and adjustments
- d) Commissioning procedures

#### **2.10.20 Electronic communications, sonar transducers and arrays**

Evidence shall show an understanding of sonar transducers and arrays to an extent indicated by the following aspects:

- a) Hazards and risk control measures
- b) Transducer types, their operating principles and parameters
- c) Transducer array encompassing:
  - Types and their construction
  - Applications
- d) Transducer hull outfits
- e) Beam forming principles and requirements
- f) Transducer installation and operational maintenance

### 2.10.21 Electronic communications, sonar system operating principles

Evidence shall show an understanding of sonar system operating principles to an extent indicated by the following aspects:

- a) The purpose and application of sonar systems
- b) Sonar equipment encompassing:
  - Types and their applications
- c) Sub-system components (i.e. functional blocks) and their function encompassing:
  - Transducer
  - Input amplifier
  - Sonar interface unit
  - Beamforming network (transmit / receive)
  - Signal processing
  - Own Doppler nullification
  - Display system
  - Headset
  - Interfaces
  - Transmitter
  - T/R Switch
  - Timer/Timing
- e) Sonar operating parameters
- f) Sonar transmission characteristics

### 2.10.22 Electronic communications, sonar measurement and set up

Evidence shall show an understanding of sonar measurement and set up to an extent indicated by the following aspects:

- a) Sonar parameters and measurements
- b) Sonar physical parameters
- c) Constraints and Consequences

### 2.10.23 Electronic communications, secondary radar and related systems

Evidence shall show an understanding of secondary radar and related systems to an extent indicated by the following aspects:

- a) Secondary radar principles encompassing:
  - Role of secondary radar
  - Transponder operation
  - Operating principles
  - Signal processing
  - Pulse generation, transmission and detection
  - Mode generation, detection and response
  - Display symbol generation
  - Synchronisation with primary radar
  - Advantages over primary radar with respect to: clutter;

- signal/noise ratio; transmit power required for operation
- b) Interfaces to other systems providing information for transmission of mode data encompassing:

- Slaving/synchronisation to primary radar
- Clutter reduction/elimination
- Defruiting
- Degarbling
- Interfaces to other systems
- Range/ducting effects
- Advantages over primary radar
- Power supplies and UPS
- International standards
- National Curriculum
- Hot standby, cold standby

- c) Application of secondary radar systems

Note.

Examples are Traffic Collision Avoidance System (TCAS), Selective Identification System (SIF), Air Traffic Control Radar Beacon System (ATCRBS), Instrument Landing System (ILS), Tactical Air Navigation (TACAN), Navigation Systems (VOR, GPS, DME), Radar Altimeter, Jamming, Electronic warfare, Second Time Round Returns (STRR), and Identification –friend or foe radar (IFF).

#### **2.10.24 Electronic communications, radar and sonar displays devices**

Evidence shall show an understanding of radar and sonar displays devices to an extent indicated by the following aspects:

- a) Types and their applications

Note.

Examples are CRT, Plasma, LCD, Monochrome, Colour, and Touch screen.

- b) Sub-system components (i.e. functional blocks) and their operating parameters encompassing:

- EHT transformers
- detectors
- video distribution
- time base generators
- phase locked loops
- microprocessors
- memory devices
- demodulators
- focusing/deflection devices
- delay lines
- bleed resistors
- HV generation

- c) Calibration testing and maintenance procedures

- d) Typical fault finding, their symptoms and cause

**2.10.25 Electronic communications, radar fundamentals**

Evidence shall show an understanding of radar fundamentals to an extent indicated by the following aspects:

- a) Hazards and risk control measures
- b) Purpose and uses of radar
- c) Environmental conditions affecting radar
- d) Design factors which affect performance
- e) Propagation of electromagnetic waves
- f) Pulse forming circuits
- g) Typical radar transmitter encompassing:
  - limitations and applications of each type
- h) Typical radar receivers encompassing:
  - Sub-system components (i.e. functional blocks) and their operating parameters
  - limitations and applications
- i) Radar antennae encompassing:
  - Types, application and radiation patterns

Note.  
Examples are parabolic, phased array, log periodic, and cos q

  - antenna gain
  - efficiency
  - length and height factors
- j) Microwave techniques, devices and applications encompassing:
  - oscillators
  - amplifiers
  - modulators and demodulators
  - mixers and detectors
- k) Types and characteristics of various radar systems

**2.10.26 Electronic communications, navigation systems**

Evidence shall show an understanding of navigation systems to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Environment factors effecting system performance
- c) Typical faults, their symptoms and cause.
- d) Fault diagnosis procedures and testing
- e) Sub-system adjustments

**2.10.27 Electronic communications, surveillance and observation**

Evidence shall show an understanding of surveillance and observation to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Environment factors effecting system performance
- c) Typical faults, their symptoms and cause.

- d) Fault diagnosis procedures and testing
- e) Sub-system adjustments

### **2.10.28 Electronic communications, global positioning systems**

Evidence shall show an understanding of global positioning systems to an extent indicated by the following aspects:

- a) Sub-system components (i.e. functional blocks) and their operating parameters
- b) Environment factors effecting system performance
- c) Typical faults, their symptoms and cause.
- d) Fault diagnosis procedures and testing
- e) Sub-system adjustments

### **2.10.29 Digital television transmission towers and equipment**

Evidence shall show an understanding of digital television transmission towers and equipment to an extent indicated by the following aspects:

- a) The requirements of DTTB program input and monitoring equipment encompassing:
  - basic system arrangement  
Note.  
Example is a central router connected to a number of control rooms.
  - Terminologies  
Note.  
Examples are Vertical, Multi-level; Tie-line Routing and cross point
  - typical signal types processed by a router.
  - the purpose of "redundant CPU's and power supply units".
  - common control protocols used in routers.
  - typical analogue audio and video output voltage levels present at the router.
  - typical specifications for digital data signals present at the router.
  - function of various test equipment used in DTTB measurements.
- b) The operating characteristics of a digital television terrestrial broadcast (DTTB) transmitter encompassing:
  - typical DTTB digital transmission system.
  - safety precautions required when working with high power RF transmitters.
  - operating characteristics of a typical MPEG encoder.
  - operation of a coded orthogonal frequency division multiplex (COFDM) modulator.
  - arrangement of subsystem components in a DTTB transmitter
  - purpose of an up converter in a DTTB transmitter.
  - typical characteristics of a DTTB power amplifier.
  - advantages and disadvantages of air and liquid cooling systems used in transmitters.
  - typical DTTB transmitter measurements techniques.
- c) The performance requirements of the DTTB combiner and antenna systems encompassing:
  - minimum channel separation required between digital and analogue TV channels

- typical specifications of an antenna combiner system.
  - the need for combiner systems in DTTB systems.
  - typical system faults in combiners and antenna system.
- d) The requirements of remote monitoring and measurement equipment encompassing:
- purpose of control panel indicators and controls.
  - Process by which the system manages a critical failure.
- Note.  
Example of component failure deemed as critical are power supplies and CPUs
- different system alarm signals.
  - periodic equipment self tests and diagnostic routines on DTTB systems.
  - DTTB systems fault diagnostic and rectification techniques.
  - function of the basic components of a DTTB system.
  - typical units of a DTTB Telemetry system

### 2.10.30 Wireless devices

Evidence shall show an understanding of wireless devices to an extent indicated by the following aspects:

- a) Types and applications
- b) Operating principles at sub-system level
- c) Programming functions
- d) Networking set up

### 2.10.31 Electrotechnology Communications Principles

Evidence shall show an understanding of Electrotechnology communications principles to an extent indicated by the following aspects:

- a) The basic electrical circuit
  - basic circuit components
  - function of basic circuit components
  - connection of components
  - measurement of circuit parameters
  - open-circuit, closed-circuit and short-circuits.
- b) Circuit parameter relationships
  - Ohms Law
  - calculation of voltage, current and resistance
  - power dissipated
  - calculation of power.
- c) Measurement instruments (voltage, current & resistance)
  - safe working procedures
  - handling and storing instruments
  - selecting and set up of instruments
  - connecting instruments
  - read analogue scales and digital readouts.

d) Effects of electrical current

- physiological effect
- heating effect
- magnetic effect
- chemical effect
- typical uses

e) EMF sources

- basic generator
- basic thermocouple
- photovoltaic cells
- piezo electric
- primary and secondary cells.

f) d.c. resistive circuits

- series circuits (set-up, measurement and calculations)
- parallel circuits (set-up, measurement and calculations)
- series-parallel circuits (set-up, measurement and calculations).

g) Capacitance

- construction of capacitors
- operation of capacitors
- units
- charge of a capacitor
- RC series circuit.

h) Magnetism and electromagnetic induction

- permanent magnets
- electromagnetism
- induced emf
- inductors
- principles of inductance
- unit of inductance
- electromagnetic radiation (EMR)
- cross talk.

i) a.c. principles

- generation of sinusoidal voltage
- a.c. circuit parameters – frequency, period, amplitude, instantaneous value, maximum value, peak value, peak to peak value and rms value
- calculation of frequency and rms values
- effects of frequency on inductors  $(X_L = 2\pi f L)$
- effects of frequency on capacitors  $(X_C = \frac{1}{2\pi f c})$
- transformers construction and operating principles.

### 2.10.32 Amateur radio communication principles, practices, and technical overview

Evidence shall show an understanding of amateur radio communication principles, practices, and technical overview to an extent indicated by the following aspects:

a) Nature of Amateur Radio encompassing:

- Nature of Amateur radio
- Types of licences
- Allocation of frequency bands

b) Licence Conditions encompassing:

- Conditions of licences
- Purpose of the Amateur Service
- Communications by Amateur stations
- Distress and Urgency signals
- Station identification
- Amateur call signs
- Secret messages
- Entertainment not permitted
- Amateur frequency bands and emissions
- Permitted power output
- Notification of change of address
- Harmful interference
- Authorised use of Amateur stations
- Inspection of Amateur licences
- Restriction of operation to avoid interference
- Use of the Licence Condition Determinations

c) Mathematics used for Amateur radio operation encompassing:

- addition, subtraction, multiplication and division
- fractions, percentage, and decimal notation
- units and sub-units; (mega, kilo, UNIT, micro, and pico)
- calculations using simple formulae

d) Amateur radio technical basics encompassing:

- Mains power overview
- Mains power supplies overview
- Voltage and current overview
- Resistance overview
- Ohm's Law overview and the relationship between voltage, current and resistance
- Power in DC circuits overview including calculations related to power in a DC circuit using current and voltage, current and resistance or voltage and resistance.
- Capacitance overview
- Inductance overview
- AC circuits overview
- Impedance and reactance overview
- Tuned circuits overview

- Transformers overview
  - Solid state devices overview
- e) Transmitters and Receivers – basic overview encompassing:
- Block diagrams of simple transmitters
  - Mixers
  - Modulation
  - Amplifiers
  - Transmission quality
  - Receiver parameters and terminology
  - Simple block diagrams of a Receiver
  - Frequency converters
  - IF amplifier
  - Automatic Gain Control
  - Transceivers
- f) Transmission lines and Antennas overview encompassing:
- Transmission line basics
  - Baluns
  - Standing waves
  - Antenna Matching Units (ATU)
  - Antennas
  - Identification of common antennas
  - Radiated Power
- g) Propagation overview encompassing:
- Electromagnetic radiation
  - Ionosphere
- h) Interference and Electromagnetic Compatibility (EMC) overview encompassing:
- Interference - Points of entry into electronic equipment
  - Filters
  - EMC
- i) Operating Practices and Procedures overview encompassing:
- Equipment practices
  - Authorised frequencies and emissions
  - Requirement not to transmit on frequencies in use
  - Operating practices
  - Operating through a repeater
  - Make an all-stations call and change frequency
  - Transmitter measurements
  - Correcting simple equipment maladjustments
  - Recognised abbreviations
  - Phonetic alphabet
- j) Safety overview encompassing:
- Dangerous voltages
  - Electrical safety - equipment to be approved

- Awareness of State Electricity Authority requirements
- Electrical earthing
- Fuses
- Correct fuses to be used
- Replacing fuses
- Station layout for safety
- Power lead safety
- Know location and desirability of a mains OFF switch
- Actions to be taken in the event of an accident involving electricity
- Electric shocks
- Call for help – use of resuscitation techniques
- Battery safety
- Antennas and safety
- Radio waves can be dangerous
- Safe distance from an antenna
- Antenna erection
- Securing and siting antennas
- Lightning protection
- Safe use of headphones
- Station security

k) Measurements

- Frequency measurements
- RF Power measurements
- SWR measurements
- Multimeter measurements

## 2.11 Equipment and tools

### 2.11.1 Hand tools

Evidence shall show an understanding of hand tools and their use to an extent indicated by the following aspects:

a) Hand tools for cutting, shaping, drilling, threading, tapping, and finishing metallic and non-metallic components encompassing:

- types of tools and their purpose
- techniques for the correct and safe use of these tools
- hazards associated with their use
- care and maintenance of hand tools

b) Tools for measuring and marking out.

- types of tools and their purpose
- techniques for the correct and safe use of these tools
- hazards associated with their use
- care and maintenance of hand tools

c) Tools for dismantling and assembling electrical and electronic components encompassing:

- types of tools and their purpose
- techniques for the correct and safe use of these tools
- hazards associated with their use
- care and maintenance of hand tools

### 2.11.2.1 Power tools

Evidence shall show an understanding of fixed and portable tools and their use to an extent indicated by the following aspects:

a) Fixed power tools for cutting, shaping, drilling, and finishing metallic and non-metallic components encompassing:

- types of tools and their purpose
- techniques for the correct and safe use of these tools
- hazards associated with their use
- care and maintenance of fixed power tools

b) Portable power tools for cutting, shaping, drilling, and structural components encompassing:

- types of tools and their purpose
- techniques for the correct and safe use of these tools
- hazards associated with their use
- care and maintenance of fixed power tools
- requirements for use on construction sites.

### 2.11.2.2 Electrical workshop machines

Evidence shall show an understanding of electrical workshop machines to an extent

indicated by the following aspects:

- a) Fixed position power tools
- b) Tooling used on drilling machines
- c) Twist drills features, sharpening and faults
- d) Drilling operations
- e) Off hand grinding safety and machine set up
- f) Principles of metal cutting encompassing:
  - Factors influencing the action of cutting tools
  - Principles of chip formation
  - Effects of cutting tool geometry
  - Effects of coolants and cutting fluids
- g) Selection of cutting tools
  - Factors influencing tool selection
  - Cutting tool materials
  - Turning cutting tool design
  - Milling cutting tool design
  - Principles of chip control
  - Identification and selection of carbides
- h) Metal cutting conditions
  - Conditions under which tools cut best
  - Determining cutting data
- i) Cutting tool defects
  - Identification of types of tool failures
  - Causes of tool failure
  - Overcoming causes of tool failure

### **2.11.3.1 Fixing and support devices and techniques**

Evidence shall show an understanding of accessories and support and fixing device and methods and their use to an extent indicated by the following aspects:

- a) Electrical/electronic/instrumentation/refrigeration/airconditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories.
- b) Device for securing and mounting electrical/electronic accessories encompassing:
  - types and safe application of screws, bolts, rivets and similar devices
  - types and safe application of devices for fixing to timber, metal, hollow structures and masonry and concrete
  - types and safe application of fixing adhesives and tapes
  - hazards and safety measures when working with adhesives and chemical fixing devices
  - regulatory requirements for use of powder fixing tools.

### **2.11.3.2 Mobile plant, tools and equipment**

Evidence shall show an understanding of tools and equipment for use with mobile plant to an extent indicated by the following aspects:

- a) Types of plant and their use
- b) Regulatory requirements for use of specific plant and equipment

#### **2.11.4 Dismantling and assembling techniques**

Evidence shall show an understanding of techniques for assembling and dismantling electrotechnology apparatus to an extent indicated by the following aspects:

- a) Purpose of sequencing dismantling and assembling.
- b) Importance of marking/labelling and storing parts
- c) Techniques for dismantling and assembling close fitting parts.
- d) Use of gasket and seals.

#### **2.11.5 Basic electrical testing and measuring devices and techniques**

Evidence shall show an understanding of the safe use and care of portable voltage testers, voltmeters, ammeters and resistance measuring instruments to an extent indicated by the following aspects:

- a) Types of voltage testers, multimeters, clamp meters, continuity testers and insulation resistance testers and their application.
- b) Features of testing/measuring devices

Note:

Features include safety, user calibration and parameter and range settings.

- c) Connection of test/measuring devices into a circuit encompassing:
  - safety procedures
  - circuit arrangement of test/measuring devices
- d) Taking readings
- e) Storage, maintenance and care of test/measuring devices.
- f) Australian Standard quality assurance requirements for test equipment calibration certification.

##### **2.11.6.1 Advance electrical testing and measuring devices**

Evidence shall show an understanding of the safe use and care of advance measuring instruments to an extent indicated by the following aspects:

- a) Test/measuring devices and their application
- b) Connection of test/measuring devices into a circuit encompassing:
  - safety procedures
  - circuit arrangement of test/measuring devices
- c) Taking readings
- d) Storage, maintenance and care of test/measuring devices

##### **2.11.6.2 Electrical field testing and measurement techniques**

Evidence shall show an understanding of electrical field testing and measurement to an extent indicated by the following aspects:

- a) Measurement concepts encompassing:
  - notion of error, accuracy, resolution

- sources of measurement error and uncertainties
- instrument specifications and calibration certificates
- test and measuring instrument safety certification levels and their application.

b) Types of field measuring instruments and their application encompassing:

- instrument meter movements and readouts

Note

These include moving coil, moving iron and dynamometer meter movements , LCD digital and screen readouts.

- Role of a microprocessor/controller in measuring instrument.

c) Measuring low voltages and direct and alternating currents encompassing:

- low voltage and current measurement techniques embodied in microprocessor based instruments.
- causes of inaccuracies and overcoming them.
- test instrument set up and safety procedures
- interpreting test readings.

d) Measuring high voltages and direct and alternating currents encompassing:

- high voltage and current measurement techniques embodied in microprocessor based instruments.
- causes of inaccuracies and overcoming them.
- test instrument set up and safety procedures
- interpreting test readings.

Measuring fault levels and (earth) fault loop impedance encompassing:

- fault and fault loop impedance measurement techniques embodied in microprocessor based instruments.
- causes of inaccuracies and overcoming them.
- test instrument set up and safety procedures
- interpreting test readings.

e) Measuring power, energy, reactive power, power factor and maximum demand encompassing:

- power measurement techniques embodied in microprocessor based instruments.
- causes of inaccuracies and overcoming them.
- test instrument set up and safety procedures
- interpreting test readings.

f) Measuring power quality encompassing:

- power measurement techniques embodied in microprocessor based instruments.
- causes of inaccuracies and overcoming them.
- test instrument set up and safety procedures
- interpreting test readings.

Note.

Power quality measurement includes waveform distortion, harmonics, power factor and transients.

### 2.11.6.3 Power cable fault detection techniques

Evidence shall show an understanding of power cable fault detection to an extent indicated by the following aspects:

a) Typical power cable faults

Note.

Faults include poor connection (high resistance), open-circuit, insulation breakdown and arcing.

b) Cable fault detection techniques .

Note.

Techniques include Varley and Murray loop tests, Pulse test, Echo test, Radio based tests.

c) Application and limitations of the various cable fault detection techniques encompassing:

- cable fault detection techniques embodied in microprocessor based instruments.
- causes of inaccuracies and overcoming them.
- test instrument set up and safety procedures
- interpreting test readings.

### 2.11.7.1 Electronic testing and measuring devices and techniques

Evidence shall show an understanding of the safe use and care of electronic measuring instruments to an extent indicated by the following aspects:

a) Test/measuring devices and their application

Note

Examples are analogue and digital multimeters, voltage and digital testers, signal generators and oscilloscopes

b) Connection of test/measuring devices into a circuit encompassing:

- safety procedures
- circuit arrangement of test/measuring devices

c) Taking readings

d) Storage, maintenance and care of test/measuring devices

### 2.11.7.2 Advanced electronic testing and measuring devices and techniques

Evidence shall show an understanding of the safe use and care of advance electronic measuring instruments to an extent indicated by the following aspects:

a) Test/measuring devices and their application

Note

Examples are frequency counters, and synthesisers, spectrum analysers, noise and distortion meters and RF communications service monitor.

b) Connection of test/measuring devices into a circuit encompassing:

- safety procedures
- loading and matching
- storage and delay
- circuit arrangement of test/measuring devices

c) Taking and interpreting readings

d) Notion of decibels including dBm, dBr, dBu, dBo

### 2.11.8 Data and voice cabling testing and testing devices

Evidence shall show an understanding of data and voice cabling testing and the correct and safe use and care of testing devices to an extent indicated by the following aspects:

a) Performance parameters associated with copper cables, coaxial cables and optical cables encompassing:

- Open circuit, short circuit and pair continuity
- Split pair and crossed pair
- Attenuation
- Return loss
- Insulation Resistance (leakage)
- Near end cross talk (NEXT)
- Attenuation to cross talk ratio (ACR)
- Loop resistance
- Noise (Impulse noise and average noise)
- Characteristic impedance

Note:

Structured cabling including, twisted pair cabling, shielded twisted pair (STP), unshielded twisted pair (UTP) and higher performance cabling.

b) Test results for compliance with required regulation, standards, and or codes for structured copper cables, coaxial; and optical fibre cables encompassing:

- Tests required to evaluate a given performance parameter
- Test equipment and leads needed to evaluate a given performance parameter.
- Operation of test equipment for correct evaluation of specific cable performance parameters and to obtain accurate and reliable results.
- Transmission performance requirements.

c) Testing and validation of a customer premises cabling installation encompassing:

- Requirements of current Standard of site certification for high performance copper cables, coaxial cable and optical fibre cables
- Reporting requirements for the completion of work related to conformity of a cabling installation.
- Documentation required in certifying a cabling installation conforms to relevant standards and specifications.

d) Optical Time Domain Reflectometer (OTDR) operating principles, applications and calibration procedures.

e) Typical causes of non compliant test results.

### 2.11.9.1 Basic refrigeration testing and measuring field devices

Evidence shall show an understanding of the safe use and care of refrigeration testing devices to an extent indicated by the following aspects:

a) Test/measuring devices and their application

b) Connection of test/measuring devices component/system undertest encompassing:

- safety procedures
- testing arrangement of test/measuring devices

c) Taking readings

d) Leak detection techniques

e) Storage, maintenance and care of test/measuring devices

Note:

Examples of testing and measuring devices are those used for temperature, pressure measurement and

leak detection.

### **2.11.9.2 Fitting and removing refrigeration service gauges**

Evidence shall show an understanding of techniques for working with refrigeration service gauges to an extent indicated by the following aspects:

- a) Risks of working with refrigerants and rotating equipments
- b) Types, applications and care of service gauges and hoses
- c) Types, applications and care of refrigeration system access fittings
- d) Procedures for use of service gauges with minimal loss of refrigerant, including: fitting, removing air, reading gauges, using pressure temperature scales/charts and removing.

### **2.11.9.3 Replacement of basic components on a refrigeration system**

Evidence shall show an understanding of techniques for replacing basic components on a refrigeration system to an extent indicated by the following aspects:

- a) Risks of working with refrigerants and rotating equipment
- b) Refrigerant isolation/pump down/recovery
- c) Prevention of system contamination
- d) Protection of damage to surrounding equipment/environment
- e) Pressure testing and refrigerant leak detection

### **2.11.9.4 Appliance diagnostic tools**

Evidence shall show an understanding of appliance diagnostic tools to an extent indicated by the following aspects:

- a) Types, construction, operation and application of electrical, electronic and mechanical diagnostic tools

Note.

Examples are appliance manufacturer specific diagnostic tools, binary code via LED display; Test instruments such as multimeters, clamp meters, insulation resistance meters, power analysers and high voltage testers; data loggers, microwave leak detectors, gas (hydrocarbon) detectors and sound meters

- b) Installation requirements, adjustments and safety encompassing:

- Manufacturers' instructions and data
- Installation safety
- Effects and risks of electrical current and mechanical movement
- Protection against indirect contact

- c) Computer and paper based diagnostic tools encompassing:

- Appliance manufacturers programs

Note.

Examples are binary code via LED display, remote fault diagnosis via phone access and remote fault diagnosis via Internet

- Text books and manufacturers data

- d) Service, fault finding and repair encompassing:

- Manufacturers' data
- Safety checks
- Operating sequence

- Typical symptoms
- Fault identification using diagnostic tools
- Confirmation of fault
- Repairs limitations

#### **2.11.10.1 Basic air conditioning measurement devices**

Evidence shall show an understanding of the safe use and care of basic air conditioning measurement devices to an extent indicated by the following aspects:

- a) Measuring devices and their application
- b) Connection of measuring devices to component/system undertest encompassing:
  - safety procedures
  - arrangement of measuring devices
- c) Taking readings
- d) Storage, maintenance and care of measuring devices

Note:

Examples of air conditioning measuring devices are those applicable to air velocity and air flow rates across a grille/register, air temperature, relative humidity. These instruments include anemometers, thermometers, sling psychrometers.

#### **2.11.10.2 Air conditioning testing devices**

Evidence shall show an understanding of the safe use and care of air conditioning testing devices to an extent indicated by the following aspects:

- a) Test/measuring devices and their application
- b) Connection of test/measuring devices component/system undertest encompassing:
  - safety procedures
  - testing arrangement of test/measuring devices
- c) Taking readings
- d) Storage, maintenance and care of test/measuring devices

Note:

Examples of air conditioning testing/measuring devices are those applicable to air volume, air velocity, air pressure, air temperature, air relative humidity and sound levels.

#### **2.11.11.1 Electronic soldering equipment and techniques**

Evidence shall show an understanding of electronic soldering equipment and their use to an extent indicated by the following aspects:

- a) Electronic soldering equipment encompassing:
  - types of equipment and their purpose
  - hazards associated with their use
  - care and maintenance of brazing and soldering equipment
- b) Electronic soldering techniques encompassing:
  - safe use of equipment
  - preparation of surfaces
  - adjusting heat

- application

#### **2.11.11.2 Surface mount soldering techniques**

Evidence shall show an understanding of surface mount soldering technique to an extent indicated by the following aspects:

- a) Identification of surface mount components
- b) Requirements of standard with respect to surface mount soldering
- c) Post solder inspection
- d) Ball grid arrays

#### **2.11.11.3 Printed circuit board repair techniques**

Evidence shall show an understanding of printed circuit board repair techniques to an extent indicated by the following aspects:

- a) Printed wiring board substrate repair encompassing:

- Substrate warpage and cracking damage
- Substrate blistering and delamination

- b) Conductor patterns repair

Note.

Examples are pad repair, pad replacement track repair, track alteration, track replacement and the like.

- c) Conformal coatings types and their removal and replacement.

#### **2.11.11.4 Lead-free soldering technology**

Evidence shall show an understanding of lead-free soldering technology to an extent indicated by the following aspects:

- a) Adoption of lead-free solder encompassing:

- Safety issues
- Environmental issues

- b) Solder types and characteristics encompassing:

- Solder wires and pastes

Note.

Examples are bimetal and trimetal

- Solder characteristics

Note.

Examples include melt and wetting temperatures, soldering temperature and flow behaviour.

- Characteristic differences between lead and lead-free solders.
- Industry standards.

- c) Types of fluxes and their activity level

Note.

Types include water soluble, no-clean and cleanable fluxes

- d) Component requirements for lead-free soldering

- Printed Circuit board (PCB)

Note.

Examples include HAZL, ID marking, conformance certificates and re-working old PCBs

- Component considerations

Note.

Examples include lead/end cap material, temperature capability and the like.

- e) Lead-free soldering cleaning requirements.

Note.

Examples include chemicals and consumable materials, when to clean, white residues and the like.

- f) Equipment requirements.

Note.

Examples include temp stability, recovery capability, tip size, tip shape, tip metal mass, tin erosion and the like.

- g) Soldering techniques.

Note.

These include soldering tip selection, temperature setting, preheating, use of soldering irons and the like.

- h) Completed soldered connections compliance requirements

### **2.11.12 Instrumentation testing and measuring field devices**

Evidence shall show an understanding of the safe use and care of instrumentation testing devices to an extent indicated by the following aspects:

- a) Test/measuring devices and their application
- b) Connection of test/measuring devices component/system under test encompassing:
- Safety procedures
  - Testing arrangement of test/measuring devices
  - Taking readings
  - Storage, maintenance and care of test/measuring devices

#### **2.11.13.1 Brazing and soldering equipment and techniques**

Evidence shall show an understanding of brazing and soldering equipment and their use to an extent indicated by the following aspects:

- a) Silver brazing and soldering equipment encompassing:
- types of equipment and their purpose
  - hazards associated with their use
  - care and maintenance of brazing and soldering equipment
- b) Silver brazing and soldering techniques encompassing:
- safe use of equipment
  - preparation of surfaces
  - adjusting gas flame
  - application
  - use of dry nitrogen to prevent contamination

#### **2.11.13.2 Introduction to welding**

Evidence shall show an understanding of welding to an extent indicated by the following aspects:

- a) Hazards associated with welding activities and equipment
- b) Welding processes and industry applications
- c) Thermal cutting techniques
- d) Manual metal arc welding processes

#### **2.11.14 Piping and tubing techniques**

Evidence shall show an understanding of techniques for working with piping and tubing to an extent indicated by the following aspects:

- a) Risks of working with piping and tubing and their control measures.
- b) Techniques encompassing:
  - Cutting pipe and tubing
  - Bending, shaping/setting pipe and tubing
  - Joining connecting/terminating pipe and tubing, this includes flaring, swaging, silver, brazing and various types of tube and threading fittings

#### **2.11.15 Portable apparatus testing (PAT) devices**

Evidence shall show an understanding of portable apparatus testing devices to an extent indicated by the following aspects:

- a) Purpose and features
- b) Testing procedures
- c) Interpretation of test results

#### **2.11.16 Electronic component place equipment**

Evidence shall show an understanding of electronic component place equipment to an extent indicated by the following aspects:

- a) Process control requirements and procedures
- b) Solder paste composition encompassing:
- c) Storage and shelf life
- d) Preparation
- e) Testing
- f) Manual solder paste deposition equipment setup and application
- g) Automatic solder paste deposition equipment setup and application
- h) Automatic component placement systems set up and operation and adjustments
- i) Reflow ovens and solder reflow
- j) Cleaning agents and techniques
- k) Inspection methods and procedures

#### **2.11.17 Electronic assembly correction and rework techniques**

Evidence shall show an understanding of techniques for correcting and reworking electronic assemblies to an extent indicated by the following aspects:

- a) Typical faults and their causes requiring correction or rework

Note.

Examples for faults are incorrect components, misalignments, poor connections, design modifications

and the like.

b) Aspects of correction and rework of electronic assemblies

Note.

Examples are readjustment of automated screen printing, component placement equipment and soldering equipment, correcting component selection, manual repair and component substitution.

**2.11.18 Electronic assembly functional and quality testing**

Evidence shall show an understanding of electronic assembly functional testing to an extent indicated by the following aspects:

a) Testing encompassing:

- Equipment set up

Note.

Testing equipment may be specific to a workplace and the electronic assembly under test

- Routine testing procedures
- Routine interpreting test results within given parameters

b) Quality inspection encompassing:

- Quality items check lists
- c) Non-compliance reporting methods

**2.11.19 Electrotechnology engineering practice**

Evidence shall show an understanding of engineering practice to an extent indicated by the following aspects:

- a) Scope of work and responsibilities
- b) Working with others in a project team
- c) Maintaining currency in technical and regulatory developments
- d) Applying and working to ethical standards

**2.11.20.1 Low voltage motor testing devices and techniques**

Evidence shall show an understanding of LV motor testing devices and techniques to an extent indicated by the following aspects:

- a) Test/measuring devices and their application
- b) Connection of test/measuring devices into a circuit encompassing:
  - safety procedures
  - circuit arrangement of test/measuring devices
- c) Taking and interpreting readings
- d) Storage, maintenance and care of test/measuring devices

**2.11.20.2 High voltage motor testing devices and techniques**

Evidence shall show an understanding of HV motor testing devices and techniques to an extent indicated by the following aspects:

- a) Test/measuring devices and their application
- b) Connection of test/measuring devices into a circuit encompassing:
  - safety procedures

- circuit arrangement of test/measuring devices
- c) Taking and interpreting readings
- d) Storage, maintenance and care of test/measuring devices

### **2.11.20.3 Electric motor mechanical measuring and testing devices and techniques**

Evidence shall show an understanding of electric motor mechanical testing devices and techniques to an extent indicated by the following aspects:

- a) Devices and techniques for measuring geometric attributes
- b) Operational Test/measuring devices and their application
- c) Setting up test/measuring devices encompassing:
  - safety procedures
  - set up procedures
- d) Taking and interpreting readings
- e) Storage, maintenance and care of test/measuring devices
- f) Measurement standards encompassing:
  - traceability relating to instruments and measurement
  - accuracy versus precision
  - quality assurance
  - errors in measurement
- g) Measuring device calibration and certification systems

## 2.12 Instrumentation

### 2.12.1 Instrumentation principles

Evidence shall show an understanding of instrumentation principles to an extent indicated by the following aspects:

- a) The role of measurement in industrial processes.
- b) Instrument measurement terminology.
- c) The standards applicable to instrumentation and process control.

Note:

Examples include fluids and respective process piping colour coding, instrument symbols

- d) Instrumentation basic calibration process

Notes:

Confined to Lever/Link mechanisms

- e) Instrumentation tables and graphs.

### 2.12.2 Pressure

Evidence shall show an understanding of pressure to an extent indicated by the following aspects:

- a) Concept of pressure and its units of measurement

Note:

For examples the relationship between pressure height and density of liquid columns and force exerted by pressure on a surface

- b) Factors defining pressure and their relationship.

Note:

Examples include absolute pressure, gauge pressure, and differential pressure

- c) Methods and devices for measuring pressure encompassing:

- Operation and characteristics of mechanical gauge elements
- Operation and characteristics of electrical pressure measuring devices
- Pressure measurement and calibration devices and methods.

- d) Factors affecting pressure measurement

### 2.12.3 Density and level

Evidence shall show an understanding of density and level to an extent indicated by the following aspects:

- a) Density and relative density
- b) Calculate density
- c) Level and/or density measuring instruments in common use.
- d) Electronic and a pneumatic level measuring instrument encompassing:
  - control loop
  - pneumatic level measuring device

#### 2.12.4 Fluid flow

Evidence shall show an understanding of fluid flow to an extent indicated by the following aspects:

- a) Principles of fluid flow (gas and liquid) encompassing:
  - basic laws of fluid flow
  - fluid flow characteristics.
- b) Units of fluid flow and flow rate encompassing:
  - SI and other commonly used units.
- c) Principles of operation of the common types of flow quantity meters encompassing:
  - principles of operation of selected quantity meters including positive displacement flow meters.
- d) Principles of operation and characteristics of the differential head types of flow rate meter encompassing:
  - principles of operation of the various differential head fluid flow meters.
  - characteristics of differential head flow meter
  - construction of selected examples of DP flow rate meters.
- e) Principles of operation and characteristics of a range of flow rate meters, other than differential head types, in use in industry.
- f) Principles of operation of selected flow rate meters
- g) Principles of operation of open channel flow meters encompassing:
  - the principles of operation of flumes and weirs.
  - various shapes of flumes and weirs.
- h) Square root extraction, integration and other computations used in relation to fluid flow encompassing:
  - Automatic computation in relation to fluid flow.
- i) Flow characteristics of a flow rate meter from practical data encompassing:
  - characteristics of a flow rate meter.
- j) Square root extraction instrument and/or a flow integrator encompassing:
  - program, calibrate or adjust a square root extractor or flow integrator.
  - report on the performance of the instrument.

#### 2.12.5 Temperature

Evidence shall show an understanding of temperature to an extent indicated by the following aspects:

- a) Temperature and other heat-related phenomena encompassing:
  - terms associated with temperature and other heat related phenomena.
- b) Temperatures between scales encompassing:
  - units commonly used in temperature measurement.
  - Imperial and SI units.
  - fixed points outlined in the International Practical Temperature Scale.
- c) Operation of the primary elements and measuring elements encompassing:
  - principles of operation and characteristics of the various temperature sensors and measuring systems.

- operation of the temperature measuring systems.
  - operation of the various compensation and protection devices utilised in temperature measuring systems.
  - techniques used for the measurement of temperature average and temperature difference using the various types of electrical thermometers.
- d) Calibration of temperature system of optimum performance.

### 2.12.6 Process control systems

Evidence shall show an understanding of process controller principles to an extent indicated by the following aspects:

- a) Controller types and basic operation and methods of achieving the control in each of the following

Note.

Examples of controller types are pneumatic: hydraulic: electronic and microprocessor

- b) Control modes used on PID controllers as they related to process requirements encompassing:

- control actions
- control options
- Set point change
- Process demand change

Note.

Examples are increasing and decreasing controller gain (in systems using P,PI, and PID); with and without Integral (in systems using PI and PID);increasing and decreasing Integral (in systems using PI and PID);with and without derivative (in systems using PID); and increasing and decreasing derivative (in systems using PID).

- c) Principles of controller alignment.
- d) Commonly accepted methods of tuning control loops
- e) Microprocessor based controllers configuration and tuning methods
- f) Purpose of various control modes and how they are applied

Note.

Examples of control modes are feedback, feedforward, cascade, ratio, batch and the like.

- g) Effect of control valve characteristics on the performance of a control loop.

### 2.12.7 Control valve principles

Evidence shall show an understanding of control valve principles to an extent indicated by the following aspects:

- a) Valve body and trim types and flow characteristics encompassing:

- control valve body types and their typical applications.
- seating and trim arrangements.
- flow characteristics of various valves.

- b) Control valve terms

Note.

Examples are leakage, turndown, rangeability, choked, flow, Cv rating, and perform basic calculations and Cv a rating

### 2.12.8 Control valve selection

Evidence shall show an understanding of control valve selection to an extent indicated by the following aspects:

- a) Valve purpose size and characteristic
- b) Valve manufactures specifications
- c) Valve faults

### 2.12.9 Actuators and positioners

Evidence shall show an understanding of actuators and positioners to an extent indicated by the following aspects:

- a) Spring opposed diaphragm actuator encompassing:
  - control valve actuators
  - air-to-raise
  - air-to-lower.
  - fail-safe action of a valve/actuator combination.
- b) Actuator characteristics and applications encompassing:
  - actuator forces, spring rate values and process pressure on valve performance.
  - spring opposed actuator to suit air-to-open and air-to-close valves. Adjust a single seating valve for shut-off.
- c) Valve positioners encompassing:
  - valve positioner operation.
  - Calibrate/adjust valve positioners for various signals.
  - cam and spring feedback positioners on control valves.
  - pneumatic, electro-pneumatic and electro hydraulic positioners/actuators.
  - Reverse positioner control action and adjust for split range.
- d) Power cylinder (piston actuator) types encompassing:
  - test power cylinders.
  - extension and retraction forces.
  - single acting positive
  - single acting negative
  - double acting
- e) Position controllers (positioners) encompassing:
  - position controllers.
- f) Directional control valves and pilot operators
- g) Power cylinder pilot valve combinations

Note.  
Examples are two, three and five port types, actuation and return modes: solenoid, mechanical, electrical, spring, regulator, filter and lubricator sets and pneumatic control circuits
- h) Self-acting pressure and temperature control valves encompassing:
  - pressure or temperature regulating valves.
  - self-acting valves to load changes.
  - pressure reducing and pressure relief valves.
  - self acting valve for required control point.

### **2.12.10 Transmitters and converters**

Evidence shall show an understanding of transmitters and converters to an extent indicated by the following aspects:

- a) Pneumatic and electronic transmitters, converters and transducers encompassing:
  - operation of transmitters, transducers and converters.
  - Calibration of various transmitters, converters and transducers
  - typical applications for a range of transmitters, transducers and converters.

#### **2.12.11.1 Industrial processes**

Evidence shall show an understanding of industrial processes to an extent indicated by the following aspects:

- a) Principles of operation of the processes studied using diagrams and circuits encompassing:
  - chemistry/physics underpinning the process.
- b) Instrumentation required for each of the selected processes.
- c) System faults encompassing:
  - causes of system failure.
  - fault location diagram.
  - methods to overcome common faults.

#### **2.12.11.2 Process control, commissioning**

Evidence shall show an understanding of commissioning process control instruments and systems to an extent indicated by the following aspects:

- a) Purpose of commissioning
- b) Commissioning planning and documentation
- c) Procedures for commissioning instrumentation encompassing:
  - configuring
  - calibrating
  - tuning
  - validating system to drawings
  - procedures followed to commission instrument systems.
- d) Purpose and importance of documentation

### **2.12.12 Distributive control principles (DCS)**

Evidence shall show an understanding of distributive control principles to an extent indicated by the following aspects:

- a) Concepts of a DCS encompassing:
  - differences between hierarchical and distributive systems.
  - Functional and geographical distribution.
- b) Individual features of a DCS encompassing:
  - Major components in a DCS

- historical and managerial data collection
- type and form of information at the operator and engineering interface levels.

Note.

Distributive control system may include programmable logic controllers, SCADA/touch screen systems, system server and smart devices connected by a control network.

- c) Function block technology to design control algorithm encompassing:
- various loop types, using function block technology from an available DCS.
- d) Optimum control of a variety of process loops.
- e) Connection of field instrumentation for selected control operation and diagnostic checking to ensure correct operation of system.
- f) On-line changes to parameters in a DCS with minimum interference to controlled variable.

### 2.12.13 Instrumentation and control communications

Evidence shall show an understanding of instrumentation and control communications to an extent indicated by the following aspects:

- a) Purpose and application of control system networks systems
- b) Open and common proprietary control system networks models (layers) and protocols
- Note.  
Examples of systems are CANopen, ControlNet, Devicenet, Ethernet, Foundation Fieldbus, Interbus, Modbus, Profibus.
- c) Control system networks interface.
- d) Remote measurement and control and typical application for telemetry systems.
- e) Categories of telemetry systems and the standards which refer to these systems.
- f) Major components of various types of telemetry system.
- g) Signal compatibility used with telemetry systems encompassing:
- signal conditioning.
  - standard signals levels
- h) Common types of signal conditioning, instruments encompassing:
- principles of operation signal conditioners and instruments
  - isolators and protection equipment.
- i) Analogue and digital signals encompassing:
- structure of a typical message block.
  - differences between analogue and digital signals.
  - typical message block used with a digital telemetry systems.
- j) Functions and operation of the main subsections of a digital telemetry system.
- k) Types of cable, connectors, sources and detectors used in a fibre optic telemetry system
- l) Types of transmission links,

### 2.12.14 Indicators and methods of recording process data

Evidence shall show an understanding of indicators and recorders to an extent indicated by the following aspects:

- a) Types of indicator and their principles of operation.
- b) Indicators in remote measurement loop.
- c) Calibration of indicators.

d) Methods and applications of recording process data encompassing:

- Need for process data
- Types of dedicated recorders and their principles of operation
- Computerised methods such as supervisory control and data acquisition (SCADA) systems

#### **2.12.15 Gas analysis**

Evidence shall show an understanding of gas analysis to an extent indicated by the following aspects:

a) Principle of operation of various indicators connected in remote measurement loop.

Note.

Examples are reagent analysers (eg. Orsat), electrolytic, paramagnetic - wind- dumbbell, zirconia oxide, thermal conductivity, thermal reaction, infra-red and the like.

b) Indicator calibration procedure

c) Types of recorder used in process measurement encompassing:

- sampling and conditioning systems.
- prescribed measuring elements.

d) Operation of hygrometers.

#### **2.12.16 Water analysis**

Evidence shall show an understanding of water analysis to an extent indicated by the following aspects:

a) Terms associated with industrial water analysis equipment.

b) Industrial applications of specified water analysis equipment.

c) Principle of operation of an analyser sensor.

d) Principle of operation of an analyser measuring elements.

e) Appropriate installation requirements for specified analysers

f) In system checks and instrument calibration

g) Water analyser maintenance procedures.

h) Manufacturers' specifications.

#### **2.12.17 Scientific analysis**

Evidence shall show an understanding of scientific analysis to an extent indicated by the following aspects:

a) Wavelength characteristics of the electromagnetic spectrum and radiation sources

b) Basic principles of refraction and dispersion encompassing:

- Wavelength and bandwidth of monochromatic devices.

c) Principle of operation of an absorption spectrometer

d) Principle of operation of an emission spectrometer

e) Principle of operation of an atomic absorption spectrometer encompassing:

f) Principle of operation of a gas chromatography

g) Principle of operation of a liquid chromatography.

h) Principles of operation of basic sample preparative instruments

### **2.12.18 Weight measurement principles**

Evidence shall show an understanding of weighing measurement principles to an extent indicated by the following aspects:

- a) Weighing and the relationship between force and weighing.
- b) Methods of weighing and common factors affecting weighing system performance.
- c) Principles of strain gauge measurement encompassing:
  - compression and tension stress.
  - relationship between stress and strain.
- d) Principles of operation of various load cells in common use encompassing:
  - Pneumatic and hydraulic load cells.
  - Linear Voltage Differential Transformer
- e) Methods of weighing materials in motion encompassing:
  - weigh feeder control
  - method of calibration of a belt weigher.
  - operation of a nuclear radiation conveyor weigher and the safety precautions to be observed.

### **2.12.19 Instrument calibration methods**

Evidence shall show an understanding of instrument calibration methods to an extent indicated by the following aspects:

- a) Purpose of calibration
- b) Calibration and set up techniques encompassing:
  - Following apparatus manufacturer's set up instructions and process requirements
  - Connecting necessary testing devices
  - Making adjustments
- c) Need to document calibration setting and procedures

#### **2.12.20.1 Process equipment installation requirements and techniques**

Evidence shall show an understanding of process equipment installation requirements and techniques to an extent indicated by the following aspects:

- a) Regulatory requirements
- b) Equipment specification
- c) Manufacturer's installation instructions
- d) System specifications
- e) Communication/signal cabling installation requirements
- f) Power wiring requirements
- g) Initial set up procedures

#### **2.12.20.2 Process control arrangements and equipment selection**

Evidence shall show an understanding of arrangement of electrical systems in buildings and equipment selection to an extent indicated by the following aspects:

- a) Typical apparatus and circuit loadings

- b) Apparatus arrangement considerations
- c) Control cable selection methods encompassing:
  - Environmental considerations
  - Signal requirements
  - Route length limitations
- d) Control tubing/piping selection criteria
- e) Selection of control cable and tubing/piping support
- f) Documentation of installation arrangements and equipment.

### 2.12.21 Control system installation, testing and verification methods

Evidence shall show an understanding of testing and verification of control installations to an extent indicated by the following aspects:

- a) Testing and verification requirements.
- b) Device calibration and set up
- c) Testing techniques
- d) Visual inspection methods
- e) Documentation

### 2.12.22.1 Medical equipment principles

Evidence shall show an understanding of medical equipment principles to an extent indicated by the following aspects:

- a) Equipment function and operation
- b) Hazards and safety procedures
- c) Causes of failure
- d) Safety testing requirements and methods

Note:

Categories and examples of medical equipment are:

- 1. Cardiovascular systems** including: blood warmers, cardiac catheterisation systems, defibrillators, electrocardiogram(ECG) machines, electrocardiogram(ECG) monitors, heart-lung machines, infusion pumps, intra-aortic balloon pumps, pacemakers, syringe pump and cardiac output measurement equipment.
- 2. Respiratory systems** including: anaesthetic delivery and monitoring units, medical gases, oxygen concentrator, pulse oximeter, respiratory humidifier, respiratory support units and ventilators.
- 3. Neurological systems** including: electroencephalograph (EEG recorder), electromyograph (EMG recorder) and intracranial pressure monitoring (ICP).
- 4. Renal systems** including: haemodialysis machine, CVVH machine and peritoneal dialysis.
- 5. Medical imaging** including: x-ray equipment, computerised axial tomography (CT scan), magnetic resonance imaging (MRI), nuclear medicine and diagnostic ultrasound equipment.
- 6. Physiological equipment** including: blood pressure monitors, foetal cardio-tocograph, infant care systems, multiparameter systems, thermometry, telemetry, networking and patient warmers.
- 7. Miscellaneous equipment** including: electrosurgery, electric stimulators, endoscopy and laparoscopy systems, laser, operating microscopes, therapeutic diathermy and ultra sound.

### 2.12.22.2 Medical equipment, anatomy and physiology and infection control

Evidence shall show an understanding of medical equipment principles to an extent indicated by the following aspects:

- a) Nature of infection
- b) Control of microbial growth
- c) Infection control strategies
- d) Body systems

### **2.12.23 Transducers and sensing devices**

Evidence shall show an understanding of transducer and sensing devices to an extent indicated by the following aspects:

- a) Measurement principles and concepts encompassing:
  - SI system of units
  - Standards, calibration and traceability
  - Accuracy precision sensitivity and sources of error
- b) Types and operating mechanisms encompassing:
  - Classifications
  - Operating principles measuring and sensing elements

Note.

Examples are detection and measurement of temperature, pressure, flow, and chemical make up; detection of linear, angular and rotary motion and proximity and level

- basic configurations of measuring circuits.
- typical device specifications
- c) Installation requirements encompassing:
  - Safety precaution for the various types of devices
  - Connecting devices
  - Locating, aligning and adjusting devices.

### **2.12.24 Calibration techniques**

Evidence shall show an understanding of calibration techniques to an extent indicated by the following aspects:

- a) Principles of common calibration techniques
- b) Purpose of Standards and calibration certification
- c) Minimising error during calibration encompassing:
  - source and type of errors
  - techniques to minimise errors during measurements
  - calculating the degree of error and calibration factors
- d) Determining the parameters to which the device will be calibrated
- e) Need for normal performance check.
- f) Purpose of calibration documentation

## 2.13 Maintenance and repair

### 2.13.1 RAPS plant area cleaning

Evidence shall show an understanding of RAPS plant area cleaning to an extent indicated by the following aspects:

- a) Needs for clean and tidy plant area
- b) RAPS system components and associated equipment and their location within the plant area

Note:

Associated equipment may include manual fuel pump

- c) Plant area cleaning techniques

Note:

Cleaning techniques include those for dealing with fuel, oil and acid and spills; removal of dust, insects, spiders, animals and removal of non-RAPS equipment

- d) Technique for reporting and dealing with cleaning issues.

### 2.13.2 RAPS systems battery bank maintenance techniques

Evidence shall show an understanding of RAPS systems battery bank maintenance to an extent indicated by the following aspects

- a) Scope of regular testing, checking and corrective actions
- b) Measurement of specific gravity and voltages of battery cells; checking and topping up electrolyte levels; checking for acid leakage, cracks in battery casing, corrosion of battery terminals and connections, cleaning of terminal connections and treating with an anticorrosive.

### 2.13.3 RAPS systems generator sets maintenance techniques

Evidence shall show an understanding of RAPS systems generator sets maintenance to an extent indicated by the following aspects

- a) Checking of radiator and oil level; periodic oil change and air, oil and fuel filter change.
- b) Maintaining log books and maintenance regime

### 2.13.4 RAPS systems photo voltaic array maintenance techniques

Evidence shall show an understanding of RAPS systems photo voltaic array maintenance to an extent indicated by the following aspects:

- a) Cleaning of photo voltaic modules; checking of module connections, connecting cable and integrity of the array structure
- b) Maintaining log books and maintenance regime

### 2.13.5 RAPS systems wind generator maintenance techniques

Evidence shall show an understanding of RAPS systems wind generator maintenance to an extent indicated by the following aspects

- a) Checking the integrity of support structure; visual inspection of wind generator operation
- b) Maintaining log books and maintenance regime

### **2.13.6 RAPS system use auditing techniques**

Evidence shall show an understanding of effective RAPS systems use to an extent indicated by the following aspects:

- a) Tidiness of RAPS plant area
- b) Appropriate use of RAPS system components

Note:

Appropriate use includes not overloading system components, using generator supply for heavy loads and the like.

- c) State of RAPS system components

### **2.13.7 RAPS systems maintenance scheduling**

Evidence shall show an understanding of RAPS systems maintenance scheduling to an extent indicated by the following aspects:

- a) Limitation of the role of the RAPS service worker
- b) Periodic maintenance planning procedures

Note:

Planning includes:

1. Development of vehicle booking procedures, check lists for replacement equipment, items to be checked, items to be replaced and procedures for recording and reporting.
2. Scheduling of maintenance at a number of homeland communities.
3. Check list for preparation of service vehicle and tools and equipment needed to carry out the maintenance
4. Processes for sourcing and funding replacement components

### **2.13.8 Scheduled maintenance processors**

Evidence shall show an understanding of maintenance processors to an extent indicated by the following aspects:

- a) Maintenance principles encompassing:
  - maintenance function
  - role of maintenance department
  - occupational health and safety requirements
- b) Maintenance systems encompassing:
  - maintenance terminology
  - preventative maintenance
  - predictive maintenance
  - corrective maintenance
- c) Data acquisition encompassing:
  - plant history cards/files
  - inspection techniques
  - predictive maintenance
  - remote visual inspection
  - non-destructive testing
  - thermography

- vibration analysis
  - oil analysis
- d) Maintenance plan encompassing:
- characteristics of plant operation
  - assessment of failure characteristics
  - link failure characteristics to maintenance systems
  - identify production windows
  - resources
  - labour
  - materials
  - establish plan
  - implementation procedures
- e) Review of maintenance plan encompassing:
- analysis of records
  - manual recording methods
- f) Computerised recording methods

### **2.13.9 Business equipment fundamentals**

Evidence shall show an understanding of business equipment to an extent indicated by the following aspects:

- a) Type of equipment
- b) Operating principles
- c) Component parts
- d) Routine faults and repairs
- e) Maintenance.

Note:

Documentation requirements for recording the maintenance process and results

### **2.13.10 Cooling plant maintenance procedures**

Evidence shall show an understanding of cooling plant maintenance procedures to an extent indicated by the following aspects:

- a) Cooling towers/evaporative condensers encompassing:
  - Types, applications.
  - Cleaning,
  - Decontamination.
- b) Humidifiers encompassing:
  - Types, applications.
  - Cleaning,
  - Decontamination.
- c) Condensate Trays and drains encompassing:
  - Fall,
  - Cleaning.
- d) Water treatment encompassing:

- Water tests,
  - Water testing procedures,
  - Ph,
  - Microbiological,
  - Suspended solids,
  - Corrosion,
  - Bleed,
  - Filtration,
  - Chemical Treatment,
  - Cathodic Protection.
- e) Air Filters encompassing:
- Types, applications.
  - Pressure drop,
  - Face Velocity,
  - Cleaning, Changing,
  - Fit.
- f) Maintenance programs encompassing:
- Purpose,
  - Methods of establishing specific requirements,
  - Planning,
  - Manual and Computer programs,
  - Log books
- g) Personal Safety encompassing:
- Risks to service personnel and public,
  - Safe practices,
  - Person protective equipment.
- h) Legal Requirements encompassing:
- Duty of Care.
- i) Codes and regulations encompassing:
- Regulation under Workplace Health and Safety Act,
  - NH&MRC recommendations,
  - Code of practice,
  - AS3666.

## **2.14. Rail signalling**

### **2.14.1 Basic rail operations**

Evidence shall show an understanding of basic rail operations to an extent indicated by the following aspects:

- a) Rail terminology
- b) Train dynamics
- c) Essentials of safe movement of trains
- d) Purpose of rail signalling

#### **2.14.2.1 Rail signalling principles, electrical**

Evidence shall show an understanding of electrical rail signalling principles to an extent indicated by the following aspects

- a) Overview of electrical rail signalling
- b) Purpose of elements of an electrical rail signalling systems.

Note:

Elements include signals, point actuating systems, locking and train detection systems, control input devices, indicators, diagrams and monitors, interlocking, and safe working systems.

#### **2.14.2.2 Rail signalling principles, mechanical**

Evidence shall show an understanding of mechanical rail signalling principles to an extent indicated by the following aspects:

- a) Overview of mechanical rail signalling
- b) Purpose of elements of a mechanical rail signalling systems.

Note:

Elements include signals, point actuating systems, locking and train detection systems, control input devices, indicators, diagrams and monitors, interlocking, and safe working systems.

### **2.14.3 Rail signalling, mechanical equipment**

Evidence shall show an understanding of rail signalling, mechanical equipment to an extent indicated by the following aspects:

- a) Equipment and their components
- b) Operating principles
- c) Servicing procedures.

### **2.14.4 Rail signalling, electrical equipment**

Evidence shall show an understanding of rail signalling, electrical equipment to an extent indicated by the following aspects:

- a) Equipment and their components
- b) Operating principles
- c) Servicing procedures.

#### **2.14.5 Rail signalling, point actuating devices**

Evidence shall show an understanding of point actuating devices to an extent indicated by the following aspects:

a) Equipment and their components

Notes:

Equipment include point machines, detectors, claw/clamp locks, swing nose mechanisms, in-bearer mechanisms

b) Operating principles

c) Servicing procedures

#### **2.14.6 Rail signalling, electronic equipment**

Evidence shall show an understanding of electronic equipment used in rail signalling to an extent indicated by the following aspects:

a) Equipment and their components

Notes:

Examples include telemetry (SCADA), monitoring systems, IASS, train describer, panel processors,

b) Operating principles and parameters

c) Servicing procedures.

#### **2.14.7 Rail signalling, computer-based interlocking**

Evidence shall show an understanding of computer-based equipment to an extent indicated by the following aspects:

a) Equipment and their components

Notes:

Examples include solid state interlocking (SSI), Microlock, Westrace

b) Operating principles and parameters

c) Servicing procedures.

#### **2.14.8 Rail signalling, computer applications**

Evidence shall show an understanding of application software used in rail signalling to an extent indicated by the following aspects:

a) Types of software and their scope

Note:

Examples include interrogator software for loggers, monitors and computer based interlocking, data base (work instruction, commissioning work structures, cable schedules.

b) Setting up and use.

#### **2.14.9 Rail signalling, train detection**

Evidence shall show an understanding of train detection to an extent indicated by the following aspects:

a) Equipment and their components

Notes:

Example include track circuits axel counters and treadles level crossing predictors

- b) Operating principles and parameters
- c) Servicing procedures

#### **2.14.10 Rail signalling, remote control systems**

Evidence shall show an understanding of rail signalling remote control systems to an extent indicated by the following aspects:

- a) Equipment and their components

Notes:

Examples include PLC, dedicated PCs, prep. systems

- b) Operating principles and parameters
- c) Servicing procedures.

#### **2.14.11.1 Rail signalling, interlocking systems, electrical**

Evidence shall show an understanding of electrical rail signalling interlocking systems to an extent indicated by the following aspects:

- a) Equipment and their components

Notes:

Examples include route setting (entrance, exit or OCS), automatic signalling, electromechanical, mechanical

- b) Operating principles and parameters
- c) Servicing procedures.

#### **2.14.11.2 Rail signalling, interlocking systems, mechanical**

Evidence shall show an understanding of mechanical rail signalling interlocking systems to an extent indicated by the following aspects:

- a) Equipment and their components
- b) Operating principles and parameters
- c) Servicing procedures.

#### **2.14.12 Rail signalling, power supplies**

Evidence shall show an understanding of rail signalling power supplies to an extent indicated by the following aspects:

- a) Equipment and their components

Notes:

1. Examples of sources include mains, transformers, motor alternator sets, photo voltaic arrays, primary and secondary battery banks, UPSs.

2. Components GGIs, automatic transfer switches circuit, earthing and surge protection, switchboards, rectifiers, converters, chargers and cabling

- b) Operating principles and parameters
- c) Servicing procedures.

#### **2.14.13 Rail signalling, electro-pneumatic equipment**

Evidence shall show an understanding of rail signalling electro-pneumatic equipment to an

extent indicated by the following aspects:

a) Equipment and their components

Notes:

Examples include compressors, air lines, control valves

b) Operating principles and parameters

c) Servicing procedures.

#### **2.14.14 Rail signalling, drawings and diagrams**

Evidence shall show an understanding of drawings, diagrams and schedules for rail signalling to an extent indicated by the following aspects:

a) Drawing types and applications encompassing:

- Drawing layouts and conventions.
- Drawing symbols

b) Cable and equipment schedules

#### **2.14.15 Rail signalling, regulations and codes**

Evidence shall show an understanding of regulations and codes for rail signalling to an extent indicated by the following aspects:

a) Codes philosophy and format

b) How to read and apply a code

c) Codes that apply to rail signalling

Note:

Codes are relevant to a particular rail network.

## 2.15 Refrigeration and air conditioning apparatus

### 2.15.1 Refrigeration compressors

Evidence shall show an understanding of refrigeration compressors to an extent indicated by the following aspects:

- a) Functions of the compressor in a refrigeration system
- b) Types of compressors and their application

Note:

Types of compressors include reciprocating; rotary; centrifugal; scroll; screw.

- c) The methods of lubrication
- d) Lubricants

Note:

Basic types and safe handling

### 2.15.2 Condensers, liquid receivers and cooling towers

Evidence shall show an understanding of refrigeration condensers, liquid receivers and cooling towers to an extent indicated by the following aspects:

- a) Functions of condensers, liquid receivers and cooling towers
- b) Types of condensers, liquid receivers and cooling towers, and their applications

### 2.15.3 Evaporators

Evidence shall show an understanding of evaporators to an extent indicated by the following aspects:

- a) Functions of evaporators
- b) Types of evaporators and their applications
- c) Types and applications of secondary refrigerants
- d) Water treatments in water cooled evaporators encompassing:
  - Need for water treatment
  - Water treatment methods
  - Regulatory requirements

#### 2.15.4.1 Refrigerant flow controls and distributors

Evidence shall show an understanding of refrigerant flow controls and distributors to an extent indicated by the following aspects:

- a) Types and application and operation of the various liquid flow controls and distributors found in a refrigeration system.
- b) Types, and application and operation of the various vapour flow controls and distributors found in a refrigeration system.
- c) Techniques for testing and adjusting liquid flow controls and distributors.
- d) Techniques for testing and adjusting vapour flow controls and distributors.
- e) Procedures for removing and installing refrigerant flow controls and distributors from operating systems with due regard to safety and refrigerant conservation.

#### **2.15.4.2 Refrigerant control selection**

Evidence shall show an understanding of refrigerant control selection to an extent indicated by the following aspects:

a) Types, application, operation, and selection of the refrigerant flow controls and distributors found in a refrigeration system.

Note:

Examples include TX valves and other metering devices, CPR valves, EPR valves, solenoid valves, hand valves

b) Types, application, operation and selection of the refrigerant pressure sensing controls found in a refrigeration system.

Note:

Examples include low pressure controls, high pressure controls and oil pressure controls

c) Types, application, operation and selection of the temperature/humidity sensing controls found in a refrigeration system.

Note:

Examples include thermostats, humidistats and defrost controls.

#### **2.15.5 Pumps**

Evidence shall show an understanding of pumps to an extent indicated by the following aspects:

a) Function of pumps in refrigeration and air conditioning systems

b) Types of controls associated with pumps and their function.

#### **2.15.6 Fans and air distribution**

Evidence shall show an understanding of fans and air distribution components to an extent indicated by the following aspects:

a) Functions, types, operation and application of fans

b) Air distribution methods and control devices

c) Air flow measurement and adjustment methods

d) Functions, types, operation and application of air filters

#### **2.15.7 Small appliance repair**

Evidence shall show an understanding of small appliance repair to an extent indicated by the following aspects:

a) Types, applications, operating principles and characteristics

b) Motors and drive mechanisms

c) Control and over current protection methods and devices

d) Typical small appliance faults encompassing:

- Motor faults
- Power supply faults
- Control faults
- Mechanical faults

#### **2.15.8 Domestic appliance principles**

Evidence shall show an understanding of domestic appliance principles to an extent indicated by the following aspects:

a) Major appliances encompassing:

Note.

Examples of major appliances are washing machines, clothes dryers, dishwashers, refrigerators, freezers, air conditioners, electrical and gas cookers and heaters

- Installation codes, statutory requirements and regulations
- Manufacturer and company installation requirements and warranty implications
- Site preparation and accessibility.
- Fixing and procedures and methods for connecting services.

b) Operation principles of major domestic appliances that use electrical, gas and/or water services and/or incorporate refrigeration encompassing:

- Purpose and operational options.
- Functions of major components.

c) Operational testing and set up procedures encompassing:

- Pre-start checking.
- Safety controls checking.
- Operating cycle testing and control adjustments

#### **2.15.9.1 Appliance refrigeration systems**

Evidence shall show an understanding of refrigerated appliances to an extent indicated by the following aspects:

- a) Types, applications, construction, components and operating characteristics
- b) Typical component wear or defects
- c) Typical faults
- d) Component repair/replacement methods
- e) Manufactures' parts catalogues and service reports

#### **2.15.9.2 Capillary systems**

Evidence shall show an understanding of capillary systems to an extent indicated by the following aspects:

- a) Requirements of Domestic Refrigeration Code of Practice.
- b) Function, types, construction, characteristics and applications encompassing:
  - system unloading
  - calculating system operating pressures
  - critical length
  - critical charge
- c) Faults leading to repair/replacement of a capillary tube
- d) Selection of replacement capillary tubes.
- e) Procedures for commissioning and servicing a capillary tube system.

#### **2.15.9.3 Retrofitting domestic refrigeration systems**

Evidence shall show an understanding of retrofitting domestic refrigeration systems to an

extent indicated by the following aspects:

- a) Reasons for retrofitting encompassing:
  - Montreal Protocol
  - Kyoto Summit
  - Global warming
  - AS Codes of Practice
  - Acts and Regulations
- b) System Analysis encompassing:
  - Equipment identification
  - Systems options
- c) Refrigerant selection encompassing:
  - Safety considerations
  - ANSI / ASHRAE Standard 34
  - AIRAH Refrigerant Selection Guide
  - Transitional and drop in-refrigerants
  - Medium and long term refrigerants
  - Refrigerant selection considerations
  - Domestic refrigeration system performance testing
  - Refrigerant recovery, recycling or reclaim
  - Lubricant selection considerations
- d) Retrofit procedure encompassing:
  - Flushing procedures
  - Retrofit procedure for CFC to blended refrigerants
- e) Performing a retrofit encompassing:
  - Refrigerant recovery
  - Flushing the system
  - Oil and drier replacement
  - Evacuation
  - Refrigerant charging
  - System labelling

#### **2.15.9.4 Split air conditioning systems**

Evidence shall show an understanding of split air conditioning systems to an extent indicated by the following aspects:

- a) Wall hung and floor mounted types and applications
- b) Construction and components

Note:

Examples are compressors, condensers, evaporators, metering devices, service ports; functions, types, basic operation

- c) Evaporation and condensing temperatures and pressure design and operating characteristics

#### **2.15.10 Clothes washers and dryers**

Evidence shall show an understanding of clothes washers and dryers to an extent indicated by the following aspects:

- a) Types, applications, construction, components and operating characteristics
- b) Typical component wear or defects
- c) Typical faults
- d) Component repair/replacement methods
- e) Manufactures' parts catalogues and service reports

#### **2.15.11 Dish washing machines**

Evidence shall show an understanding of dish washing machines to an extent indicated by the following aspects:

- a) Types, applications, construction, components and operating characteristics
- b) Typical component wear or defects
- c) Typical faults
- d) Component repair/replacement methods
- e) Manufactures' parts catalogues and service reports

#### **2.15.12 Gas cooking appliances**

Evidence shall show an understanding of gas cooking appliances to an extent indicated by the following aspects:

- a) Types, applications, construction, components and operating characteristics
- b) Typical component wear or defects
- c) Typical faults
- d) Component repair/replacement methods
- e) Manufactures' parts catalogues and service reports

#### **2.15.13 Room air conditioners**

Evidence shall show an understanding of room air conditioners to an extent indicated by the following aspects:

- a) Types, applications, construction, components and operating characteristics
- b) Typical component wear or defects
- c) Typical faults
- d) Component repair/replacement methods
- e) Manufactures' parts catalogues and service reports

#### **2.15.14 Appliance, testing and compliance verification methods**

Evidence shall show an understanding of appliance testing and compliance verification to an extent indicated by the following aspects:

- a) Mandatory testing and verification requirements.
- b) Appliance efficiency
- c) Testing techniques
- d) Visual inspection methods

### 2.15.15 HVAC control systems fundamentals

Evidence shall show an understanding of HVAC control systems to an extent indicated by the following aspects:

- a) Control fundamentals
  - control terminology
  - HVAC system characteristics
  - control system characteristics
  - control system components
  - product knowledge
- b) Types of control equipment
  - pneumatic:
    - terminology
    - symbols
    - pneumatic control systems
    - air supply equipment
    - thermostats
    - controllers
    - actuators
    - relays - switches
  - electrical:
    - classification of circuits
    - two position control
    - floating control
    - sensors
    - controllers
    - flow control devices
  - electronic:
    - operating principles
    - sensors
    - controllers
    - control systems
- c) DDC systems
  - terminology
  - controllers
  - controller software
  - basic controller programming
  - applications
- d) Control systems applications
  - air handling system controls
  - ventilation
  - heating
  - building airflow system control

- airflow control - singles and multi -
  - zones
  - chiller boiler and distribution system control (chilled water, boiler, distribution systems)
- e) Supervisory control systems
- systems function
  - configurations
  - introduction building management
  - remote building control interface and modem

### **2.15.16 Energy management systems for commercial refrigeration**

Evidence shall show an understanding of energy management systems for commercial refrigeration to an extent indicated by the following aspects:

- a) Functions of a commercial refrigeration E.M.S.
- General control function
  - Inputs
  - Outputs
  - Communications
  - Graphing
  - Supervising
  - Data logging
  - Scheduling
  - Alarms
  - Power consumption
- b) E.M.S. control components
- Identify components
  - Pressure sensors
  - Temperature sensors
  - Timeclocks
  - Humidity sensors
  - Liquid level sensors
  - Leak detector sensor
  - State the function and operating parameters of components
  - Pressure sensors
  - Temperature sensors
  - Timeclocks
  - Humidity sensors
  - Liquid level sensors
  - Leak detector sensors
- c) Installation requirements and consideration
- Installation of controller(s)
  - Installation of refrigerant leak detector

- Systems
  - Installation of accessory boards
  - Installation of pressure transducers & wiring
  - Installation of temperature sensors & wiring
  - Control wiring considerations
- d) System design and applications
- Select control components to suit given applications
  - Determine system operating parameters
  - Pressure sensors
  - Temperature sensors
  - Timeclocks
  - Humidity sensors
  - Liquid level sensors
  - Leak detector sensors
  - Defrost
  - Alarm panel
- e) Programming a control system
- Display terminal and keypad functions
  - Calibration of sensors
  - Changing original settings
  - Program a given set of parameters to suit an application
- f) Component testing and fault finding
- Trouble shooting
  - Testing of components

### **2.15.17 Refrigeration/HVAC direct digital controls**

Evidence shall show an understanding of refrigeration/HVAC direct digital controls to an extent indicated by the following aspects:

- a) Computer based control fundamentals
- Definitions
  - Principles
- b) Controller configuration
- Equipment
  - Zone level controllers
  - System level controllers
- c) Controller software
- Operating software
  - Application software
- d) Controller programming
- System diagrams
  - Control diagrams
  - Configuration

- Programming
  - Initialisation
  - EMS, BMS
  - SCADA system
  - Lan, Bacnet
- e) Sensors and actuators
- f) Applications
- Refrigeration systems
  - HVAC systems
  - Logic analysis
  - Energy management
  - Asset management
  - Life cycle

### **2.15.18 Refrigeration/HVAC pneumatic controls**

Evidence shall show an understanding of refrigeration/HVAC pneumatic controls to an extent indicated by the following aspects:

- a) Control fundamentals
- Pneumatic control terminology
  - Definitions
- b) Control basics
- Air supply
  - Pilot bleed system
  - Signal amplifier
  - Sensing elements
  - Relays and switches
- c) Air supply system
- Air drying methods
  - Pressure regulating valves
  - Pressure reducing valves
- d) System controllers
- Thermostats
  - Sensors
  - Actuators
  - Dampers
- e) System control configuration
- Sequence control
  - Limit control
  - Changeover control
  - Compensated control
  - Recycling control
  - Pneumatic – electric control

f) Control systems

- Refrigeration systems
- Ventilation systems
- Multi-zone A/C systems
- Variable air volume A/C systems
- Face and by-pass system
- Economiser system
- Chilled water systems
- Hot water systems

**2.15.19 HVAC air systems**

Evidence shall show an understanding of HVAC air systems to an extent indicated by the following aspects:

a) Air distribution principles

- air diffuser selection
- factors affecting the design of ductwork systems
- types of ductwork systems
- static, velocity and total pressure
- laminar and turbulent flow
- moody diagram
- parameters that control cost

b) Pressure loss

- friction and dynamic
- Colebrook - White formula
- in ducts, friction charts
- in fittings, loss co-efficients
- fitting selection criteria
- diffuser pressure loss

c) System sizing

- velocity method
- equal friction method
- static regain method
- balanced pressure drop method
- circular to rectangular equivalent
- standard duct sizes and gauges
- balancing

d) Heat and leakage losses

- heat gain/loss calculation
- bare vs insulated
- leakage

e) Overview of noise in duct systems

- noise sources in duct systems

- attenuation
  - impact on design
  - methods of control
- f) Fans
- types and characteristics
  - fan laws
  - system effect
  - fan selection
  - fan and system curves
- g) Air systems
- dual and single duct constant volume
  - variable volume
  - induction units
  - multi-zone
  - diversity factors

### 2.15.20 HVAC hydronic systems

Evidence shall show an understanding of HVAC hydronic systems to an extent indicated by the following aspects:

- a) Systems operation
- closed/open systems
  - pump head/lift, static head (high rise building)
  - system friction losses
  - nett positive suction head
  - system curves
- b) Pumps
- types
  - selection criteria
  - performance characteristics
  - bladder tanks
  - coil characteristics
  - heat exchangers: plate, shell and tube, tube in tube
  - flow measurements: types
  - flow switchers
  - builders: types and performance characteristics
  - cooling towers: elementary cooling thermodynamics and types
- c) Valves - flow control devices
- types and applications
  - throttling characteristics
  - flow measurements
  - selection and applications
- d) Piping systems

- balancing and commissioning
- air venting
- water treatment
- vacuum breaking and air breaks

### 2.15.21 Refrigeration/HVAC electronic controls

Evidence shall show an understanding of refrigeration/HVAC electronic controls to an extent indicated by the following aspects:

- a) Control fundamentals
  - Electronic control terminology
  - Definitions
- b) Electronic control basics
  - Voltage supplies
  - Analogue control
  - Controller basics
  - Inputs and outputs
- c) Controllers
  - Variable (e.g temperature)
  - Step
  - Enthalpy
  - Compensation
  - Time proportional
- d) Sensors
  - Temperature
  - Humidity
  - Enthalpy
  - Pressure
  - Velocity
- e) Actuators
  - Water valves
  - Dampers
  - Relays
- f) Control systems
  - Refrigeration systems
  - Ventilation systems
  - Multi-zone A/C systems
  - Variable air volume A/C systems
  - Face and by-pass system
  - Economiser system
  - Chilled water systems
  - Hot water systems

### 2.15.22 HVAC control systems

Evidence shall show an understanding of HVAC control systems to an extent indicated by the following aspects:

- a) Control diagrams
  - electric/electronic control diagrams
  - electrical installation documents
  - pneumatic diagrams
  - DDC diagrams
  - controls/electrical power circuit interface
  - nomographs
- b) Evaluate existing automatic control systems
  - review of HVAC system components
  - specifications
  - briefs
  - descriptions of operation
- c) Control requirements
  - standard and statutory requirements
  - economy of operation (energy management)

### 2.15.23 Microbial control fundamentals

Evidence shall show an understanding of microbial control fundamentals to an extent indicated by the following aspects:

- a) Legislation and regulatory requirements for microbial control
- b) Types of air and water systems that require control of harmful microbes.
- c) Harmful microbes and they effects in left uncontrolled
- d) Methods of controlling harmful microbes

Note.

Methods include regular cleaning/decontamination of effected plant, sample testing and approved treatment.

- e) Safe handling and application of treatment materials.

### 2.15.24 Cool rooms/freezer rooms

Evidence shall show an understanding of cool rooms/freezer rooms to an extent indicated by the following aspects:

- a) Food spoilage encompassing:
  - Effects of storage conditions
  - Controlled atmosphere
  - Relative humidity
  - Evaporator temperature difference
- b) Types and construction encompassing:
  - Pre-fabricated and permanent type walk-in cool rooms and freezer rooms
  - Construction

- Insulation
  - Vapour barrier
  - Frost heave
  - Interior fittings
- c) Layouts and installation encompassing:
- Location of equipment
  - Equipment site arrangements and building services
  - Access and obstructions
  - Power supply and electrical services
  - Arrangement of piping
- d) Components and features encompassing:
- Refrigerant controls
  - Evaporators
  - Solenoid valves
  - Crankcase pressure regulators
  - Defrosting method and mullions
  - Drain facilities and heaters
  - Pressured relief valves
  - Door hardware
  - Lighting and germicidal lamps
- e) System and defrost controls encompassing:
- Operating conditions
  - Thermostat and pressure controls
  - Defrost timers and controllers
  - Overloads and safety control
  - Electrical control circuits

#### **2.15.25 Package air conditioning systems**

Evidence shall show an understanding of package air conditioning systems to an extent indicated by the following aspects:

- a) Types and applications encompassing:
- Safety, environmental and Legislative Issues
  - Construction features
  - Component and their characteristics
  - Ancillary equipment
- b) System design features encompassing:
- Heat Loads
- c) Characteristics

#### **2.15.26 Merchandising and display cabinets**

Evidence shall show an understanding of merchandising and display cabinets to an extent indicated by the following aspects:

- a) Types and construction encompassing:
  - Deep freeze meat, dairy, and fruit and vegetables
  - Multi deck display type
  - Single deck, well type and island cases
  - Glass door/reach-in merchandiser
- b) Components and features encompassing:
  - Condensing units
  - Refrigerant controls
  - Evaporators and fans
  - Defrosting method and mullions
  - Drain facilities and drain heaters
  - Air distribution and air-flow curtains
  - Cabinet air temperature, velocity and direction
  - Accessories
  - Lighting
- c) Layouts and installation encompassing:
  - Location of equipment
  - Equipment site arrangements and building services
  - Access and obstructions
  - Power supply and electrical services
  - Arrangement of piping
- d) System and defrost controls encompassing:
  - Operating conditions
  - Alarm systems
  - Thermostats and pressure controls
  - Defrost timers and controllers
  - Electrical control circuits
- e) Multiple systems encompassing:
  - Multiple compressors
  - Multiple evaporators
  - Heat reclaim systems
  - Multi-temperature accessories
  - Controls and sequencing

### **2.15.27 Cooling towers, evaporative condensers, evaporative coolers and associated equipment**

Evidence shall show an understanding of cooling towers, evaporative condensers, evaporative coolers and associated equipment to an extent indicated by the following aspects:

- a) Health requirements under the Act and regulations
- b) Types, applications and their construction encompassing:
  - System components and their function
  - System operation

- Process cooling operation
- c) Installation requirements encompassing:
- Water supply and drainage requirements
  - Electrical requirements
  - Special site requirements
  - Location and securing of equipment
  - Provision for water treatment
  - Foundation requirements
  - Local authority requirements and codes
  - Relevant legislation, legal obligations
  - Development/building approvals
- d) Installation and assembly methods encompassing:
- Tower identification
  - Manufacturer's drawings, specifications and assembly instructions
- e) Water pumps and pumping systems encompassing:
- Pump characteristics from pump curves
  - Pumping flow controllers

### **2.15.28 Residential air conditioning**

Evidence shall show an understanding of residential air conditioning to an extent indicated by the following aspects:

- a) Regulations and codes to installation and service of residential air conditioning systems.
- Types, application, construction and operation of residential air conditioners.
  - Construction and operation of the major components within a system.
  - Operation of a typical system.
  - Typical application for various types of systems
- b) Procedures for selecting a system for a specific application encompassing:
- Note.  
Procedures include determining heat load sources using estimated methods and using manufacturer's data.
- c) Installation procedures.

### **2.15.29 Servicing refrigeration and air conditioning systems**

Evidence shall show an understanding of refrigeration and air conditioning to an extent indicated by the following aspects:

- a) Preventative maintenance schedules and procedures.
- b) Normal and abnormal system and component operations
- c) Gathering and evaluation symptoms
- d) Determining and testing for faults
- e) Procedures for rectifying faults

### **2.15.30 Commissioning refrigeration and air conditioning systems**

Evidence shall show an understanding of refrigeration and air conditioning to an extent

indicated by the following aspects:

- a) Determining system design and operating conditions.
- b) Testing, measurements and adjustments
- c) Design and “as installed” drawings
- d) Commissioning reports

## 2.16 Refrigeration and air conditioning installations

### 2.16.1 Refrigeration pipework and accessories

Evidence shall show an understanding of refrigeration pipework and accessories to an extent indicated by the following aspects:

a) Appropriate piping arrangements

Note:

Adequate piping arrangements include those for discharge lines, liquid lines, suction lines, incorporation valves, dryers, site glasses, accumulators, oil separators, heat exchangers, traps and piping for multiple compressor systems

b) Pipe work accessories and their location

Note:

Pipe work accessories include clamps, joiners, fittings and connections.

c) Pipe work installation techniques

### 2.16.2 Refrigeration pipework layout

Evidence shall show an understanding of refrigeration pipework layout to an extent indicated by the following aspects:

a) Position of equipment in relation pipework

b) Requirements for vertical and horizontal pipe runs.

c) Requirements for oil return and prevention of flood back

d) Techniques for the prevention of noise and vibration

e) Pipework insulation requirements

### 2.16.3 Refrigeration installations, equipment requirements

Evidence shall show an understanding of refrigeration installations, equipment requirements to an extent indicated by the following aspects:

a) Standards, codes and requirements applicable to installing refrigeration equipment.

b) Techniques for installing equipment and accessories encompassing:

- Application of accessories
- Locating and placing components
- Terminating piping
- Maintenance of fire rating integrity.

### 2.16.4 Refrigeration pipe selection and sizing

Evidence shall show an understanding of refrigeration pipe selection and sizing to an extent indicated by the following aspects:

a) Use of velocity/pressure drop tables

b) Pressure drop in lines, components and fittings

c) Oil migration stabilisation

d) Refrigerant velocity

e) Effect of varying system capacity

f) Oil traps, risers and double risers

- g) Liquid migration
- h) Parallel components and multiplex systems

### **2.16.5 Refrigeration and air conditioning installations, testing and verification methods**

Evidence shall show an understanding of testing and verification to an extent indicated by the following aspects:

- a) Mandatory testing and verification requirements.
- b) Optional testing and their appropriate use
- c) Testing techniques
- d) Visual inspection methods

### **2.16.6 Split air conditioning system installation**

Evidence shall show an understanding of installing split air conditioning systems to an extent indicated by the following aspects:

- a) Relevant codes for the installation of residential split air conditioning systems encompassing:
  - building codes, electrical, health, environmental
- (b) Types, construction, operation and application of residential split air conditioners encompassing:
  - Types: floor and wall mounted, ducted, cassette
  - refrigeration system and reverse cycle
  - control systems
  - air distribution, fans, filters
  - noise and vibration
- c) Installation of unit and pipework encompassing:
  - respect for customers premises
  - unit location and mounting
  - fixing, securing and mounting methods
  - safe lifting, use of ladder and platforms
  - manufacturers installation and start up instructions
  - refrigerant piping: layout, installation, insulation, fastening and covering
  - condensate drains and pumps
- d) Starting up system encompassing:
  - manufacturers start up instructions
  - pressure testing
  - evacuation
  - opening outdoor unit valves
  - checking refrigerant charge: pressures, temperature, sweat line and evaporator superheat
  - adding refrigerant
  - leak detection
  - controls - operating and safety

- customer familiarisation

### **2.16.7 High pressure refrigerant installation**

Evidence shall show an understanding of installing high pressure refrigerant systems to an extent indicated by the following aspects:

- a) The function, types, properties, applications, requirements, handling and disposal of refrigerant oils used in the high pressure systems.
- b) The essential service tools required to work with high pressure refrigerants encompassing:
  - Gauge manifold and hoses
  - Vacuum Gauge (Microns)
  - Leak Detectors
  - Flaring Tools
  - Torque wrench for flare nuts
  - Refrigerant Scales
  - Digital temperature measuring thermocouples
- c) Installation, commissioning and service procedures required for high pressure refrigerant systems encompassing:
  - Flaring and brazing
  - Pressure testing (as per HB40 and AS/NZS1677)
  - Evacuation
  - Charging and Recharging
  - Leak detection
  - Recovery
- d) The correct safety procedures required to work with high pressure refrigerants encompassing:
  - Personal safety protection equipment
  - Refrigerant and oil handling
  - Material Safety Data Sheets (MSDS)
  - HB40, AS/NZS1677, AS2030, copper tube code
  - Storage, filling and transport of refrigerant cylinders
  - Equipment rooms, job site safety, ventilation and environmental considerations.

### **2.16.8 Fault-finding and diagnostic techniques**

Evidence shall show an understanding of fault-finding and diagnostic skills to an extent indicated by the following aspects:

- a) Establish an accurate description of the fault situation by appropriate questioning of client or operator
  - Demonstrate questioning techniques to efficiently and effectively obtain from a client/operator a description of a fault situation.
- b) Confirm the fault history and symptoms through observation and application of first-line tests.
  - Demonstrate ability to draw valid conclusions from observations. Identify concepts of broad first-line testing.

c) In the absence of the client or operator, to establish the symptoms through application of systematic tests and observation.

- Identify appropriate diagnostic tests for given symptoms using manufacturers' charts, handbooks, specification sheets.
- Use results of systematic tests to identify symptoms.

### **2.16.9 Commissioning - HVAC systems**

Evidence shall show an understanding of commissioning - HVAC systems to an extent indicated by the following aspects:

a) Fundamentals

- building specifications/requirements/responsibilities
- building codes
- local government regulations
- human comfort - comfort chart
- reporting procedures
- review fluid mechanic principles
- pre-commissioning checks
- calibration of instruments, data collection and recording, documentation

b) Air systems

- Air testing and balancing
- air flow
- pressure
- temperature
- fan testing
- air balancing procedures
- leakage testing
- system capacity calculations

c) Hydronic systems

- hydronic tab instruments
- fluid flow
- pressure
- temperature
- pumps: pump curves and system curves
- pump testing
- hydronic
  - balancing procedures
  - general
  - compensation method
  - balancing valves
  - capacity calculations

d) Plant and equipment

- controls
- heat exchangers

- chillers
- boilers
- cooling towers

#### 2.16.10 Commissioning commercial / industrial refrigeration systems

Evidence shall show an understanding of commissioning commercial/industrial refrigeration systems to an extent indicated by the following aspects:

a) Fundamentals

- Building specifications/requirements/responsibilities
- Building Codes
- Local Government regulations
- Design conditions
- Reporting procedures
- Review fluid mechanics principles
- Pre – commissioning checks

b) Air Systems (excluding air balancing)

- Air Tabulation instruments
- air flow
- pressure
- temperature
- fan testing
- leakage testing
- system capacity calculations

c) Hydronic Systems

- Hydronic tabulation instruments
- fluid flow
- pressure
- temperature
- Pumps
- Pump curves and system curves
- Pump testing
- Hydronic
- balancing procedures
- general
- compensation method
- Balancing valves
- Capacity calculations

d) Refrigeration Systems

- AS1677
- HB40
- Pressure testing
- Evacuation

- Charging
  - Control setting
  - Commissioning reports
  - System performance and capacity
- e) Plant and equipment
- Controls
  - Heat exchangers
  - Chillers
  - Boilers
  - Cooling towers

### **2.16.11 Air conditioning drawing**

Evidence shall show an understanding of air conditioning drawing to an extent indicated by the following aspects:

- a) Standards, regulations and codes
- b) Architectural and mechanical drafting conventions encompassing:
- Fire, hydraulic, electrical layout diagrams,
  - Sketching of pipework circuits and mechanical services,
  - Drawing standards and symbols,
  - Working, detail and assembly drawings,
  - Ductwork layouts and conventions,
  - Pipework layouts and conventions,
- c) Computer aided drawing techniques

### **2.16.12.1 Energy management fundamentals**

Evidence shall show an understanding of energy management fundamentals to an extent indicated by the following aspects:

- a) Typical energy sources and characteristics
- supply authorities
  - standard units of measurement
  - electricity
  - steam
  - hot water
  - high temperature hot water
  - town gas
  - LP Gas
  - solar
  - waste heat
  - petrol
  - diesel
- b) Energy Usage
- office lighting

- air conditioning systems
  - refrigeration systems
  - security systems
  - computer systems
  - standby/emergency systems
  - lifts and escalators
- c) Energy auditing process
- energy costs and tariffs
  - energy consumption
  - predicting future costs
  - plotting consumption trends
  - historical data
  - collecting information using surveys
  - comparisons of actual to recorded usage
  - energy balance
  - instrumentation
  - building management systems
  - estimating savings potential
- d) System operation for energy efficiency
- types of systems
  - efficiency in building structures
  - operation of a vehicle fleet
  - proportion total energy consumption against individual systems
  - passive building design
  - preventative maintenance procedures
  - monitoring building management systems
  - operation of major and minor plant
  - inappropriate energy management procedures
  - building plant control systems
  - Australian standards/local authority requirements
  - case studies
- e) Implementing energy management procedures for a building
- recording base year data
  - climatic conditions for locality
  - establishing energy costs and tariffs
  - building and systems surveys
  - pay back period
  - survey analysis
  - energy conservation procedures
  - informing stockholders
  - recommendations and documentation
  - implementation issues

- monitoring, evaluation and follow up

### 2.16.12.2 Energy management

Evidence shall show an understanding of energy management to an extent indicated by the following aspects:

- a) Identification of major energy consuming plant
  - review of HVAC system components
  - lighting systems
  - building energy profiles
- b) Methods of energy conservation
  - review of energy conserving strategies
  - house keeping
    - a. time schedules
    - b. lighting control
  - good maintenance practices
    - c. filters, fans, appropriate set points, dead bands etc.
  - HVAC system control
    - d. night cycle
    - e. optimum stop/start
    - f. purge cycles
    - g. chiller/boiler/cooling tower sequencing
    - h. economy cycles (based on temperature or enthalpy).
    - i. supply air reset
    - j. condenser water temperature reset
  - electrical load control
    - k. power demand control
    - l. load limiting
    - m. load shedding
    - n. set point relaxation
    - o. ventilation cycles
- c) Tests and data collection procedures
  - use of BMS for data collection (trending)
  - use of data recorders (loggers)
  - monitoring of building operations generally
- d) Analyse results from test data
  - compare against standards (BOMA)
  - review current practices against ideal
  - total consumption vs peak load
  - electricity tariffs and implications
- e) Methods of reducing energy usage
  - plant retrofits
  - controls - application of strategies in 2
  - plant - fixed OA to economy, boiler to electric reheat, constant volume to VAV etc.

cost/benefit (payback).

### 2.16.13 Building management systems

Evidence shall show an understanding of building management systems to an extent indicated by the following aspects:

a) Functions of a BMS

- autonomous Functions
- input
- output
- general I/O
- installation management items
- energy management
- risk management
- information processing
- objectives
- building running costs
- smoke control as per AS 1668 part 1

b) BMS hardware

- system architecture
- communication devices
- substations
- PC's
- interfaces with other systems

c) Input and output functions

- digital inputs/outputs
- digital output with status feedback
- analogue input/output
- sensors
- alarms

d) Energy management

- night cycle
- optimum stop/start
- time and event programs
- night purge
- outside air percentage control
- enthalpy control
- power demand control
- duty cycle
- presence detection
- lighting control

e) Information processing functions

- computer systems

- central system management
  - programs
  - system configuration and security
  - operator - machine interface
  - data points
- f) Risk and maintenance management
- system files
  - fire, intruder control
  - access control

### **2.16.14 Management of indoor air quality**

Evidence shall show an understanding of management of indoor air quality to an extent indicated by the following aspects:

- a) Indoor air quality factors
- interactive nature of pollutants
  - comfort criteria
  - source of odours
  - pathway from source to occupants
  - occupant activities
  - impact on productivity
- b) Cause of IAQ problems
- moisture
  - mould and mildew
  - bacterial growths
  - asbestos and other particulate
  - volatile chemicals produced in the building
  - chemical products
- c) HVAC systems
- types of HVAC systems
  - system components
  - duct cleaning
  - system commissioning
  - operation of system
  - damper adjustment
- d) Measurements
- common parameters to measure
  - measurement devices available
  - instrument calibration
  - analysing and interpreting results
  - laboratory tests
  - standards
- e) Resolving IAQ problems

- conducting IAQ investigations
  - the walk-through
  - building history
  - HVAC system information
  - occupant interviews
  - troubleshooting
- f) IAQ management
- building IAQ profile
  - location of potential IAQ problems
  - procedures to control IAQ
  - communication
  - response to complaints
  - equipment preventive maintenance
  - chemical inventory

### 2.16.15 Computer aided drafting

Evidence shall show an understanding of computer aided drafting to an extent indicated by the following aspects:

- a) Specific procedures
- Creating symbols for library files
  - Program specific commands
    - Speed enhancement
  - Configuring the digitising tablet
- b) Methodology for creating layers
- Name
  - Colour
  - Linetype
- c) Methodology for drawing variables
- Limits
  - Grid
  - Snap
  - Dimensions
  - Text
  - Units
- d) ISO drawing sheets
- e) Advanced drawings
- f) Multiple three dimensional views
- Setting up environment on screen
  - Top view
  - Front and side views
  - Three dimensional views
- g) Movement through space

- Draw on any created views
  - Relocate coordinate system as necessary
- h) Creation of views
- Creation of three dimensional geometric shapes
  - Creation of three dimensional complex view by:
    - p. Manipulation of drawing planes
    - q. Location of geometric shapes
- i) Editing
- Use of function to facilitate modification of geometric shapes in completion of a three dimensional view
- j) Display of three dimensional view
- Wire Line
  - Solid Face
  - Isometric
  - Perspective
  - Orthographic
- k) Saving
- Use of assembly drawing file for plotting

### **2.16.16 Refrigeration system components and piping**

Evidence shall show an understanding of refrigeration system components and piping to an extent indicated by the following aspects:

- a) Standards and Codes encompassing:
- AS1677, detailed understanding
  - AS 3666, overview  
ozone protection regulations
  - IAR Ammonia Data Book
  - ANSI/IAR standards
  - ANSI/ASHRAE Mechanical Refrigeration and IAR
  - bulletins and standards
- b) Calculation of capacity in heat exchangers encompassing:
- $Q = UA (LMTD)$
  - $Q = mc \otimes t$
  - $Q = m \otimes h$
- c) Evaporators encompassing:
- commercial types and applications
  - coil bypass factor
  - effects of evaporator TD on space humidity
  - effects of air circulation on product conditions
  - selection criteria and selection tables
- d) Condensers encompassing:
- commercial types and applications

- effects of ambient conditions
  - condenser control
  - heat rejection factor
  - condenser TD
  - selection criteria and selection tables
- e) Compressors encompassing:
- types and applications
  - capacity
  - displacement
  - volume flow rate
  - theoretical capacity
  - total volumetric efficiency
  - effect of operating conditions, including suction
  - pressure drop and superheating
  - actual capacity
  - power
  - theoretical requirement
  - effects of operating conditions
  - actual requirements
  - post defrost loads
  - pull down torque requirements, high, medium and low back pressure compressors
  - selection tables, motor selection
- f) Liquid expansion devices
- types, operation and applications
  - effects from sub-cooling
  - distributor types, operation and applications
  - selection tables
- g) System load balance point encompassing:
- graphical representation
- h) Line sizing an design
- velocity tables
  - pressure drop in lines and fittings
  - oil migration stabilisation
  - refrigerant velocity
  - effect of varying system capacity
  - oil traps
  - risers
  - double risers
  - liquid migration
  - design for parallel components and multiplex systems
- i) Automatic controls
- fin spacing, suction temp to evaporator suction

- hot-gas bypass valves
- electronic control of valves PLC control
- refrigerant regulating valves
- solenoid valves
- condenser pressure regulating valves
- evaporator pressure regulating valves
- crankcase pressure regulating valves
- cycling controls
- pressure-stats
- thermostats,
- defrost controls
- monitoring and alarm controls
- refrigeration automation systems
- control strategies
- control modes

#### **2.16.17 Retrofitting refrigeration systems**

Evidence shall show an understanding of retrofitting refrigeration systems to an extent indicated by the following aspects:

- a) Systems and refrigerants suitable for retrofitting encompassing:
  - Code and regulation for retrofitting a refrigeration system.
  - Suitable refrigerants for retrofitting into existing systems.
- b) Retrofitting a refrigerant into a system encompassing:
  - Retrofit procedures.
  - Selection of refrigerant, oil and components.
- c) Procedures for modify an existing system to meet the requirements of the alternative refrigerant encompassing:
  - Evaluating performance of a system prior to being retrofitted.
  - Testing refrigerant oil in accordance with industry standard.
  - Reclaiming and evacuate system.
  - Removing and replacing components.
  - Pressure testing, evacuating and charging.
- d) Procedures for commissioning a retrofitted system to the prescribed standard encompassing:
  - Setting operational and safety controls.
  - Testing electrical components.
  - Adjusting controls and checking system operation.
- e) Evaluating key performance factors of a system before and after a retrofit.

## **2.17 Refrigeration and air conditioning principles and applications**

### **2.17.1.1 Refrigeration fundamentals**

Evidence shall show an understanding of refrigeration fundamentals to an extent indicated by the following aspects:

- a) Principles of heat transfer
- b) Temperature scales and measurement
- c) Pressure scales and measurement
- d) Relationship between pressure and temperature
- e) The operation of the vapour compression refrigeration cycle.
- f) Refrigeration system components
- g) High and low side pressure
- h) Saturation, superheat, subcooling and enthalpy
- i) Basic pressure, temperature, state and heat cycles
- j) Applications of refrigeration

### **2.17.1.2 Basic refrigeration system operating conditions**

Evidence shall show an understanding of basic refrigeration system operating conditions to an extent indicated by the following aspects:

- a) Evaporator temperature difference
- b) Condenser temperature difference
- c) Ambient conditions
- d) Low side temperatures and pressures
- e) High side temperatures and pressures

### **2.17.2.1 Refrigerants**

Evidence shall show an understanding of refrigerants to an extent indicated by the following aspects:

- a) Properties for refrigerants in current use and their alternatives
- b) Causes and effects of contamination in refrigeration systems
- c) Procedures for working with refrigerants encompassing:
  - Reclaiming/recovering refrigerants
  - Pressure testing refrigeration systems
  - Dealing with contamination in refrigeration systems
  - Evacuating refrigeration systems
  - Detecting refrigerant leaks
  - Charging refrigerant
- d) Properties and applications of refrigeration oils in current use

### **2.17.2.2 Split air conditioning refrigerants**

Evidence shall show an understanding of refrigerants commonly used in split air conditioning systems to an extent indicated by the following aspects:

- a) Properties for refrigerants in current use
- b) Causes of contamination in the system
- c) Procedures for working with refrigerants encompassing:
  - Reclaiming/recovering refrigerants
  - Pressure testing systems
  - Evacuating systems
  - Detecting refrigerant leaks
  - Charging refrigerant
- d) Properties of refrigeration oils in current use

### 2.17.2.3 Appliance refrigerants

Evidence shall show an understanding of refrigerants commonly used in refrigeration and freezer appliances to an extent indicated by the following aspects:

- a) Properties for refrigerants in current use
- b) Causes of contamination in the systems
- c) Procedures for working with refrigerants encompassing:
  - Reclaiming/recovering refrigerants
  - Pressure testing systems
  - Dealing with contamination in refrigeration systems
  - Evacuating systems
  - Detecting refrigerant leaks
  - Charging refrigerant
- d) Properties of refrigeration oils in current use

### 2.17.2.4 High pressure refrigerants

Evidence shall show an understanding of installing high pressure refrigerant to an extent indicated by the following aspects:

- a) The phase out CFC/HCFC refrigerants in favour of environmentally friendly refrigerants and the responsibilities of installers and manufacturers
- b) The chemistry of R22 and its replacement high pressure refrigerants (R407C and R410A), their properties and applications
- c) The function, types, properties, applications, requirements, handling and disposal of refrigerant oils used in the high pressure systems
- d) The essential service tools required to work with high pressure refrigerants
- e) The differences in the materials required for high pressure refrigerant systems
- f) Installation, commissioning and service procedures required for high pressure refrigerant systems
- g) Safety procedures required to work with high pressure refrigerants.

### 2.17.2.5 Natural refrigerants

Evidence shall show an understanding of natural refrigerants to an extent indicated by the following aspects:

- a) The phase out CFC / HCFC refrigerants in favour of environmentally friendly

refrigerants and the responsibilities of installers and manufacturers

- b) The chemistry natural refrigerants, their properties and applications
- c) The function, types, properties, applications, requirements, handling and disposal of refrigerant oils used in the natural systems
- d) The essential service tools required to work with natural refrigerants
- e) The differences in the materials required for natural refrigerant systems
- f) Installation, commissioning and service procedures required for natural refrigerant systems
- g) Safety procedures required to work with natural refrigerants

### **2.17.3.1 Refrigeration system capacity control**

Evidence shall show an understanding of refrigeration system capacity control to an extent indicated by the following aspects:

- a) Methods of system capacity control

Note:

Capacity control includes the role of oil pressure; refrigerant bypass; air flow; water flow; multiple units and compressor speed.

### **2.17.3.2 Refrigeration systems and compressor operation**

Evidence shall show an understanding of the operation of refrigeration systems and compressors to an extent indicated by the following aspects:

- a) The vapour-compression cycle

Note:

Vapour-compression cycle includes refrigeration effect; flow rate; specific volume; system capacity; discharge temperature; total heat rejection; heat of compression and refrigerant properties and effects

- b) Methods of system capacity control

Note:

Capacity control includes the role of oil pressure; refrigerant bypass; air flow; water flow; multiple units and compressor speed.

- c) System efficiency encompassing:

- Compressor parameters

Note:

Examples are piston displacement; compressor displacement; compression ratio; compressor efficiency and heat exchange design.

- Compressor drive methods

Note:

Examples are belt drives; direct drives; speed vs pulley size and alignment requirements.

### **2.17.4 Air conditioning fundamentals**

Evidence shall show an understanding of air conditioning fundamentals to an extent indicated by the following aspects:

- a) Psychrometric terms, basic processes, measurement and charts encompassing:

- Parameter
- Methods

- b) Basic air conditioning heat loads sources and effects encompassing:

- Elements of heat load
  - Industry check figures
  - Basic quick selection heat load tables/graphs
- c) Basic air conditioning process, terms, requirements, classifications and applications
- d) Basic ventilation terms, requirements, methods and applications
- e) Basic air conditioning systems, types, layout and applications

### **2.17.5 Central plant air conditioning systems**

Evidence shall show an understanding of central plant air conditioning systems to an extent indicated by the following aspects:

- a) System characteristics, design features, applications, construction, components and typical layout arrangements.
- b) Operating and control principles
- c) Maintenance schedules
- d) System faults and testing methods
- e) Secondary systems and refrigerants

### **2.17.6 Hydronic systems**

Evidence shall show an understanding of hydronic systems applied to refrigeration and/or air conditioning applications to an extent indicated by the following aspects:

- a) System characteristics, design features, applications, construction, components and typical layout arrangements.
- b) Operating and control principles
- c) Maintenance schedules
- d) System faults and testing methods

### **2.17.7 Beverage dispensers**

Evidence shall show an understanding of beverage dispensers to an extent indicated by the following aspects:

- a) System characteristics, design features, applications, construction, components, and typical layout arrangements.
- b) Operating and control principles
- c) Maintenance schedules
- d) System faults and testing methods
- e) Pure food act and HACCP
- f) Dispensed beverage product knowledge:

Note:

Examples are beer, wine, spirits, soft drinks, and the like

### **2.17.8 Transport refrigeration systems**

Evidence shall show an understanding of transport refrigeration systems to an extent indicated by the following aspects:

- a) System characteristics, design features, applications, construction, components and typical layout arrangements.

- b) Operating and control principles
- c) Maintenance schedules
- d) System faults and testing methods
- e) External power sources

Note:

Examples are diesel/petrol engines, electrical, dual power supplies

### **2.17.9 Ultra-low temperature refrigeration systems**

Evidence shall show an understanding of ultra-low temperature refrigeration systems to an extent indicated by the following aspects:

- a) System characteristics, design features, applications, construction, components and typical layout arrangements.
- b) Operating and control principles
- c) Maintenance schedules
- d) System faults and testing methods
- e) Suitability of refrigerants for each application

#### **2.17.10.1 Post mix refrigeration systems**

Evidence shall show an understanding of post mix refrigeration systems to an extent indicated by the following aspects:

- a) System characteristics, design features, applications, construction, components and typical layout arrangements.
- b) Operating and control principles
- c) Maintenance schedules
- d) System faults and testing methods
- e) Pure food act and HACCP
- f) Dispensed beverage product knowledge:

Note:

Examples are beer, wine, spirits, soft drinks, and the like

#### **2.17.10.2 Dairy refrigeration systems**

Evidence shall show an understanding of dairy refrigeration systems to an extent indicated by the following aspects:

- a) System characteristics, design features, applications, construction, components and typical layout arrangements.
- b) Operating and control principles
- c) Maintenance schedules
- d) System faults and testing methods
- e) Pure food act and HACCP
- f) Dispensed beverage product knowledge

#### **2.17.11 Ice making systems**

Evidence shall show an understanding of ice making systems to an extent indicated by the following aspects:

- a) System characteristics, design features, applications, construction, components and

typical layout arrangements.

- b) Operating and control principles
- c) Maintenance schedules
- d) System faults and testing methods
- e) Pure food act and HACCP
- f) Dispensed beverage product knowledge

#### **2.17.12 Industrial refrigeration systems**

Evidence shall show an understanding of industrial refrigeration systems to an extent indicated by the following aspects:

- a) System characteristics, design features, applications, construction, components and typical layout arrangements.
- b) Operating and control principles
- c) Maintenance schedules
- d) System faults and testing methods
- e) Secondary refrigerants and systems

#### **2.17.13 Refrigeration system analysis**

Evidence shall show an understanding of refrigeration system analysis to an extent indicated by the following aspects:

- a) Pressure Enthalpy Definitions
  - high pressure & low pressure refrigerants e.g. R124 & R23
  - triple point of new refrigerants
  - glide of trinary blends
  - differential evaporation of refrigerant blends
  - variable refrigerant volume
- b) Refrigeration cycle
  - expansion process
  - vaporising process
  - compression process
  - condensing process
  - compression ratio
- c) Enthalpy processes
  - co-efficient of performance
  - effect of suction temperature on cycle efficiency
  - effect of condensing temperature on cycle efficiency
- d) Actual refrigerating cycles
  - effects of superheating suction vapour
  - superheating without useful cooling
  - superheating that produces useful cooling
  - superheating in suction piping outside the refrigerated space
  - superheating the vapour inside the refrigerated space
  - effects of subcooling the liquid

- liquid - suction heat exchangers
- effects of pressure losses resulting from friction

#### 2.17.14.1 Refrigeration engineering mathematics fundamentals

Evidence shall show an understanding of engineering mathematics fundamentals to an extent indicated by the following aspects:

a) Arithmetic

- Rational and irrational numbers, surds
- SI units, conversion using unity brackets
- Laws of indices (base 10), scientific and engineering notation
- Estimations, errors and approximations, significant figures

b) Algebra

- Substitution
- +, -, x on simple polynomials. Simple indices
- Expanding brackets
- Factorising quadratics. Common factors, difference of two squares
- Simplifying algebraic fractions
- Transposition of engineering formulae
- Solving one variable equations
- Simple algebraic division.

c) Geometry

- Pythagoras Theorem
- Angles: degrees, radians. Parallel lines cut by a transverse
- Triangles: sum of angles, properties of equilateral and isosceles triangles
- Congruent triangles
- Similar triangles: ratio of corresponding sides
- Sin, cos, tan: ratios of a right angled triangle
- Sine and cosine rules
- Circles: circumference, arcs, chords, tangents, circle theorems
- Area and perimeter mensuration on above figures.

d) Coordinate geometry

- 2D plane;  $x$ - $y$  axes,  $s$ - $t$  axes
- Graph of linear function,  $y = ax + b$ . Functional notation,  $y = f(x)$
- Straight line given slope and one point or given two points
- Linear equations: solving algebraically and geometrically
- Solving 2 linear functions simultaneously, algebraically and geometrically
- Line segment: length and mid point.

#### 2.17.14.2 Refrigeration engineering advanced mathematics

Evidence shall show an understanding of engineering mathematics to an extent indicated by the following aspects:

a) Matrices

- The operations: addition (subtraction), scalar multiplication, matrix multiplication up to 3x3 matrices.
  - Identity matrix, inverse matrix
  - Elementary algebraic manipulation of matrices
  - Solve up to three equations (linear) in three unknowns using inverse matrices and determinants.
- b) Quadratic Functions
- Graphs of quadratic functions represented by parabolas and significance of the leading coefficient
  - Zeros represented graphically
  - Solve quadratic equations by factoring and quadratic formula
  - Solve simultaneously linear and quadratic equations algebraically and geometrically.
  - Engineering Mathematics- B
- c) Exponential and Logarithmic Functions
- Laws of indices
  - Graph of  $f(x) = kabx$ , emphasising  $a = 10, e$
  - Definition of the logarithm to any base
  - Graph of  $f(x) = k \log_a bx$ , emphasising  $a = 10, e$
  - Solve exponential and simple log equations using indices, logs, calculator, graphically
  - Change of log base, emphasising 10 and e
  - Growth and decay
- d) Trigonometric Functions
- The ratios: sin, cos, tan, cosec, sec, cot
  - Degrees, radians
  - Graphs of  $k f(ax + b)$  where  $f(x) = \sin x, \cos x, \tan x$ , and significance of  $k, a, b$ , for example  $V = V_m \sin(\omega t + \phi)$
  - Trigonometric identities
  - Solve trigonometric equations

### 2.17.15 Refrigeration science

Evidence shall show an understanding of refrigeration science to an extent indicated by the following aspects:

#### a) Engineering mechanics

- mass/density
- weight
- forces
- specific gravity
- equilibrium
- momentum
- friction loss
- velocity and speed
- energy in all forms

- mechanical advantage
- efficiency
- pressure/stress
- b) Molecular theory
  - changes of state
  - sublimation
  - expansion and contraction
  - electron flow
  - state of aggregation
  - internal potential energy
  - phase change diagrams
- c) Thermodynamics
  - temperature scales
  - conservation of energy
  - specific heat
  - sensible, latent and super heat
  - properties of steam
  - enthalpy
  - heat energy/temperature relationship
  - heat balance on a body
  - heat transfer
  - conductivity
  - calorimetry
  - Peltier effect
  - 1st and 2nd law of thermodynamics
- d) Gas laws and liquids
  - pressure
  - Boyles law
  - Charles law
  - Volumetric relationship
  - psychrometrics
  - latent heat of vaporisation
  - relative humidity
  - air conditioning processes
  - dynamic pressure loss
  - velocity and static pressure
  - bourdon tubes
  - density and relative density
  - Archimedes principle
  - Bernoulli's Equation
  - manometers
  - absorption refrigeration

- centrifugal compression
  - external work of a liquid
  - pressure volume diagrams
  - isothermal and adiabatic processes
  - polytropic processes
  - Dalton’s law of partial pressure
- e) Vapour compression
- pressure/enthalpy relationship
  - entropy
  - characteristics of the evaporation, condensation,
  - compression and pressure drop phases
  - co-efficient of performance
  - theoretical/practical cycles
  - characteristics of refrigerants
  - theoretical power input
  - pressure losses
  - heat exchange
  - effects of condensing condition changes
  - sub-cooling and super-heating

### **2.17.16 Heat load estimating of commercial refrigeration**

Evidence shall show an understanding of heat load estimating of commercial refrigeration to an extent indicated by the following aspects:

- a) Heat transfer
- factors affecting heat transfer
  - insulation material characteristics
  - vapour barriers (seals)
  - ambient conditions
  - composite walls (heat flows)
  - types of common insulation
  - thermal conductivity
  - film factors
- b) Air change load
- room volumes
  - room usage (average, medium, heavy)
  - heat removed from cooling air to refrigerated conditions
  - air curtains
  - temperature differences
  - door opening sizes
  - Tamm’s equation
- c) Product load
- sensible heat

- latent heat
  - heat of respiration
  - storage temperatures
  - unit running times
  - humidity
  - air flows
  - stacking of products
  - freeze, chill, thaw times
- d) Total freezer/cool room loads
- wall load
  - air change load
  - product load
  - miscellaneous
  - total load, safety factor and unit running times
  - floor loads in cool rooms
  - door opening loads (ASHRAE & RADS methods)
  - door opening loads (for trucks)
- e) Process cooling loads
- cooling chemical reactions
  - energy balance methods
  - sensible & latent cooling of gases
  - sensible & latent cooling of water vapour in gas streams
- f) Computer programs
- g) Cabinet construction and design
- deep freeze case
  - meat case
  - dairy case
  - fruit and vegetable case
  - drink cabinets

#### **2.17.17.1 HVAC load estimating fundamentals**

Evidence shall show an understanding of HVAC load estimating fundamentals to an extent indicated by the following aspects:

- a) Heat flow in buildings
- conduction
  - convection
  - radiation
  - heat paths
- b) Thermal storage
- c) Different methods of calculations
- ASHRAE
  - Carrier

- finite difference
- d) U Values.
- e) Film coefficients.
- f) Solar heat
  - direct
  - diffuse
  - sol air temperature
  - sun position calculations
- g) Design conditions
  - outdoor
  - monthly/daily corrections
  - comfort/critical
  - indoor
  - effective temperature
- h) Thermal comfort.
- i) Space characteristics.
- j) Equipment location.
- k) Zoning.
- l) Internal loads
  - lighting
  - equipment
  - people
  - load profiles
  - internal partitions
- m) Fresh air/AS 1668
- n) Calculation of fabric loads
  - walls
  - roofs
  - floors
- o) Windows
  - glass types and factors
  - shade factors
  - internal and external shading
  - shading from adjacent structures
- p) Air quantity calculation
  - psychrometrics
  - by-pass factor
  - coil load
  - VAV air quantities
- q) Piping and other losses.
- r) Refrigeration plant load.
- s) Equipment selection
  - coils

- air handling
- chillers/boilers
- t) Fresh air preconditioners.
- u) Fresh/exhaust air heat exchangers.
- v) Computer software
- responsible use

#### **2.17.17.2 HVAC load estimating**

Evidence shall show an understanding of HVAC load estimating to an extent indicated by the following aspects:

- a) System design parameters
  - human comfort
  - system requirements in accordance with AS1668
  - heat transfer calculations for complex structures and building components
  - heat and radiation transfer calculations through complex glass structures including various internal and external shading devices
  - indoor air quality
  - olfs and decipols
- b) Complex shading
  - solar data, azimuth and altitude angles
  - shading from adjacent structures
- c) Computer software
  - heat load estimating
  - building performance analysis

#### **2.17.18.1 Thermodynamics fundamentals**

Evidence shall show an understanding of thermodynamics to an extent indicated by the following aspects:

- a) Energy and humanity
  - Need for energy and relationship between energy usage and standard of living
  - Energy conversion - typical processes and efficiencies
  - Sources of energy
  - Solar energy - direct heating, photosynthesis, solar cells, power tower, hydrogen for solar energy, ocean thermal energy collector, solar ponds, wind and wave energy, hydro-electric power
  - Geothermal energy
  - Tidal energy
  - Nuclear energy - fission and fusion, burner and breeder reactors
  - Stored fuel reserves
  - Fuel conservation - reduction in wastage, recycling, greater usage efficiency and use of waste heat
  - Thermodynamics
- b) Basic Concepts

- Nature of matter - atoms, molecules, inter-molecular forces, molecular motion, states of matter
  - Mass and conservation of mass principle
  - Volume, density, specific volume, relative density
  - Force, weight, pressure (atmospheric, gauge and absolute)
  - Temperature (Celsius and Kelvin)
  - Systems and black box analysis
  - Reciprocating piston and cylinder mechanism – pressure ratio and compression ratio
- c) Energy
- Definition and principles
  - Potential energy
  - Kinetic energy
  - Work (linear and rotational), constant and variable force, relationship to pressure and volume change
  - Power (linear and rotational)
  - Sensible heat - specific heat capacity (constant pressure and constant volume)
  - Latent heat
  - Chemical energy - energy content of a fuel
  - Internal energy
- d) Energy transfer in closed and open systems
- Definition of a closed system
  - Calorimetry as an example of a closed system (with or without phase change)
  - Thermodynamics 1
  - Non-flow energy equation - typical applications such as stirring with simultaneous heating or cooling
  - Definition of an open system
  - Mass and volume flow rate and continuity equation
  - Steady flow energy equation (negligible change in kinetic or potential energy) leading to the concept of enthalpy - typical applications such as turbines, compressors, boilers and heat exchangers.
- e) Gases
- Definition of a perfect or ideal gas in terms of the molecular model
  - General gas equation
  - Characteristic gas equation (equation of state)
  - Constant pressure process
  - Constant volume process
  - Isothermal process
  - Polytropic process
  - Adiabatic process
- f) Heat engines
- Definition of a heat engine
  - Essentials of a heat engine - heat source, heat sink, working substance, mechanical power output, working cycle
  - Energy balance for a heat engine (as a black box) and efficiency

- Maximum possible efficiency (Carnot efficiency)
  - Types of heat engines according to working substance, heat source, mechanical arrangement and working cycle
  - Typical practical cycles - Stirling, Otto, Diesel, dual, two stroke (spark and compression ignition. Joule cycle.
  - Thermodynamics 1
- g) Heat engine performance
- Measurement of torque and power output - rope brake, shoe brake, hydraulic dynamometer, electric dynamometer
  - Heat supply rate, efficiency, specific fuel consumption
  - Measurement of indicated power - mechanical indicator, electric/electronic indicator, Morse test
  - Friction power, mechanical efficiency, indicated thermal efficiency
  - Volumetric efficiency
  - Energy balance
  - Performance curves - variable load constant speed, variable speed constant throttle setting.

### 2.17.18.2 Thermodynamics

Evidence shall show an understanding of thermodynamics to an extent indicated by the following aspects:

a) Heat transfer

- Modes of heat transfer
- Conduction through a flat plate, series flat plates, thick and thin wall pipe, composite pipes (eg lagged pipes and drums)
- Convection at a flat surface or tube
- Radiation from a flat surface or tube for black or grey bodies
- Combined conduction and convection through single or multiple flat plates or thin wall tubes
- Combined convection and radiation
- Combined conduction, convection and radiation such as fluid in a tank (convection to wall), through wall and/or insulation (conduction) to outside air (convection and radiation)
- Heat exchangers - parallel, counterflow and cross flow

b) Combustion and fuels

- The combustion process
- Fuels - desirable and undesirable characteristics, solid, liquid and gaseous types, their relative advantages and disadvantages and common methods of combustion
- Air/fuel ration - stoichiometric excess or insufficient air
- Emissions and pollutants and their control
- Combustion equations - element mass balance
- Combustion products - gravimetric basis

c) Steam

- Importance of steam for heat transfer and power production
- Steam/water properties and the inter-relationship between the various properties for

- unsaturated or saturated water or steam either superheated, saturated or wet
- Saturation temperature and pressure, specific enthalpy, specific volume, dryness fraction
- Temperature-specific enthalpy diagram for steam/water
- Use of steam table to determine steam/water properties (any condition except supercritical)
- Steam generation - water tube and fire tube boilers, boiler efficiency
- Safety devices and controls used with boilers
- Steam plant - steam traps, economiser, air, pre-heater, superheater, air/water separators, water treatment, feedwater pump, exhaust gas treatment
- Heat transfer rates to or from steam/water (any condition except supercritical)
- Steam throttling and formation of flash steam
- Steam heat exchangers and barrel calorimeters
- Steam plant for process heating
- Steam plant for power production
- d) Refrigeration/heat pump
  - Basic principles and terminology
  - Vapour compression cycle
  - Performance criteria
  - Types of refrigerant - designation, properties advantages and disadvantages
  - Refrigerant properties using the p-h diagram
  - Ideal vapour compression cycle on the p-h diagram
  - Energy balance and heat transfers in compressor, evaporator and condenser
  - Actual vapour compression cycle and variations from the ideal - pressure loss in lines and non-ideal compression
  - Superheating and subcooling with or without suction/liquid heat exchanger
  - Carnot principle applied to refrigerator and heat pump Principles of evaporative refrigeration, absorption refrigeration, air cycle refrigeration and thermo-electric refrigeration

### 2.17.18.3 Heater exchanger design

Evidence shall show an understanding of heater exchanger design to an extent indicated by the following aspects:

- a) Concepts
- b) Design parameters and limitations
- c) Construction material and components
- d) Testing requirements

### 2.17.19 Fluid mechanics fundamentals

Evidence shall show an understanding of fluid mechanics fundamentals to an extent indicated by the following aspects:

- a) Basic properties of fluids
  - Description of a fluid and the difference between solids and fluids, liquids and gases, hydraulics and pneumatics

- Chemical properties, reaction with metals, corrosiveness, flammability, toxicity, pollution and environmental
  - effects
  - Dissolves gases and particles in liquids (slurries)
  - Foaming of liquids. Basic properties and units - mass, volume, density, specific volume, relative density, force and weight, pressure (absolute, atmospheric and gauge), temperature (Celsius and Kelvin), viscosity, surface tension
  - Vapour pressure of a liquid - saturation vapour pressure
  - Temperature and pressure effects on the basic properties
  - Ideal/perfect gases and liquids
  - Gas laws for ideal gases
  - Fluid Mechanics 1
- b) Components
- Pipes, channels, tubes and ducts (rigid and flexible)
  - Valves - gate, globe, non-return/foot, needle, ball, plug cock, diaphragm, pressure regulating/reducing, safety
  - valves
  - Filters and strainers for gases and liquids
  - Gauges and instruments - pressure and temperature gauges, liquid level gauges, thermometers, thermocouples, manometers, piezometers
  - Pipe fittings - elbows/bends, enlargement/contractions, coupler/unions, tees
  - Tanks and vessels - storage tanks, pressure vessels, header and surge tanks, weirs/dams/reservoirs
  - Nozzles/spray heads
  - Flow measurement instruments - venturi and orifice meters, pitot tube, rotameter, anemometer (fan/hot wire)
  - Pumps/compressors, motors/turbines
  - Actuators - linear (cylinders) and rotary
  - Selection of equipment and instruments considering properties and compatibility
- c) Fluid statics
- Pressure at a point, direction of pressure on a surface
  - Pressure variation with depth in a liquid
  - Pascal's Principle
  - Manometer/piezometer calculations (vertical and inclined)
  - Forces due to fluid pressure on vertical, horizontal and inclined surfaces
  - Centre of pressure
  - Archimedes Principle - buoyancy, flotation, apparent weight and centre of buoyancy
- d) Fluid flow
- Steady and unsteady flow, streamlines and eddies
  - Velocity - average or mean and local
  - Mass and volume flow rate
  - Conservation of mass leading to the Continuity Equation for fluid flow
  - Modification of the Continuity Equation for volume flow of liquids or gases with small changes in density

- Bernoulli Equation for ideal fluids, meaning of pressure, velocity and potential head.  
Total head
- Causes of head loss and modification of the Bernoulli Equation to include a head loss term for real fluids
- e) Fluid power
  - Definition and units for work, torque and power
  - Relationship between force, velocity and power and torque, angular velocity and power
  - Work done by a gas expanding at constant pressure
  - Relationship between fluid power, mass flow rate and head
  - Relationship between fluid power, volume flow rate and pressure
  - Efficiency of a pump or turbine
  - Modification of the Bernoulli Equation to include a pump or turbine in the fluid circuit as well as a head loss term
- f) Forces developed by flowing fluids
  - Impulse-momentum equation for fluid flow
  - Force developed by a jet striking a stationary plate - perpendicular, inclined or curved
  - Force developed by a jet striking a moving plate or blade
  - Force developed by a jet striking a series of moving plates or blades - power developed and efficiency

### **2.17.20 Materials strength fundamentals**

Evidence shall show an understanding of strength of materials to an extent indicated by the following aspects:

- a) Stress and strain
  - normal stress and strain
  - modules of elasticity
  - deformation
  - Poisson's Ratio
  - shear stress and strain
  - modulus of rigidity
  - yield stress, ultimate stress, proportional limit
  - factor of safety
  - allowable stress
- b) Centrally loaded connections
  - bolted connections
  - shear, tensile and bearing stresses
  - centrally loaded welded connections
  - fillet and butt
  - method of failure
  - size and length
  - punching of plates
- c) Thin walled pressure vessels
  - define thin wall

- longitudinal stress
- hoop stress
- d) Properties of plane figures
  - first moment of area
  - second moment of area
- e) Simple beams (point and distribute loads)
  - shear force diagrams
  - bending moment diagrams
  - bending stress
  - deflection by formula
- f) Torsional stress
  - torque diagrams
  - angle of twist
  - torsional shear stress
- g) Thermal stress
  - coefficient of linear expansion
  - thermal stresses in single members

#### **2.17.21.1 Noise and vibration control fundamentals**

Evidence shall show an understanding of noise and vibration control fundamentals to an extent indicated by the following aspects:

- a) Fundamentals of sound
  - frequency
  - decibels
  - octave bands
  - direct sound
  - velocity
  - sound pressure level
  - sound power level
  - sound meters
- b) Noise and people
  - physical measurement of sound
  - weighting networks
  - NR curves
  - noise damage to hearing
  - evaluate daily noise exposures
  - peak noise levels
  - attenuation for hearing protectors
  - excess noise levels permissible
  - noise abatement acts
- c) Identify and analyse problems
  - one-dimensional sound waves

- standing waves
- energy in a sound wave
- sources
- effects of air turbulence
- transmitters
- amplifiers
- absorptivity
- reflectivity
- room characteristics
- acoustic design in buildings
- fan and air noise transmission in ducts
- d) Methods of control
  - natural attenuation
  - sound absorbing materials, placement
  - duct lining
  - lined plenums
  - lined duct splitters
  - duct attenuators
  - white noise
  - vibration isolators
- e) Acoustic specifications
  - attenuator ratings

#### **2.17.21.2 Advanced noise and vibration control**

Evidence shall show an understanding of advance noise and vibration control to an extent indicated by the following aspects:

- a) Fundamentals of sound
  - Frequency
  - Decibels
  - Octave bands
  - Direct sound
  - Velocity
  - Sound pressure level
  - Sound power level
  - Sound meters
- b) Noise and people
  - Physical measurement of sound
  - Weighting networks
  - NR curves
  - Noise damage to hearing
  - Evaluate daily noise exposures
  - Peak noise levels

- Attenuation for hearing protectors
  - Excess noise levels permissible
  - Noise Abatement Act
  - Advanced Noise and Vibration Control
- c) Sound in confined and unconfined spaces
- Inverse square laws
  - Direct and reflective sound
  - Define reverberation time
  - Sabine's formula
  - Absorption coefficients of surfaces
  - Types of absorbers and their operation
  - Insulation performances of partitions
- d) Sound insulation
- Plant room breakout
  - Controlling plant room noise
- e) Duct borne noise
- Sound power spectra for fans
  - Noise attenuation in ducts and fittings
  - Reducing fan noise transmission
  - Regeneration noise
  - Sources of regenerated noise
  - Use tables to estimate regenerative noises
  - Breakout situations
  - Fan noise breakout
  - List methods of controlling breakout
- f) Controlling the cost
- Economical use of attenuation
- g) Vibration
- SHM (Simple Harmonic Motion)
  - Period
  - Frequency
  - Amplitude
  - Estimate frequencies for fans, pumps and refrigeration plant
  - Estimate transmission of vibration
  - Vibration control for building structures
  - Use transmissibility graphs to select springs, vibration eliminators and pads
  - Types of isolation materials and mounting devices
  - Select isolation and mounting devices
  - Inertia blocks
- h) Noise and vibration analysis computer software packages.

### 2.17.22 Refrigeration and food storage technology

Evidence shall show an understanding of refrigeration and food storage technology to an extent indicated by the following aspects:

- a) Food spoilage and possible causes
  - physical damage
  - animal activity
  - chemical breakdown
  - enzyme activity
  - micro-organisms
  - effects of temperature change
  - effects of humidity change
  - effects of freezing on fresh produce
  - effects of slow freezing time
  - effect of refreezing
- b) Food preservation
  - removing or taking out a reactant
  - removing or inactivating the catalyst
  - reducing temperature
  - changing the reaction system
  - irradiation
- c) Micro-organisms
  - conditions for growth
  - potentially hazardous foods
  - cross contamination
- d) Identification of food spoilage
  - recognition and suggest possible cause
  - physical damage
  - animal activity
  - chemical breakdown
  - enzyme activity
  - micro - organisms
- e) Types of heat processing techniques
  - heat processing using steam and water
  - blanching
  - pasteurisation
  - sterilisation
  - evaporation
  - heat processing using hot air
  - dehydration
  - baking and roasting
- f) Types of chilling processing techniques
  - chilling and controlled atmosphere storage
  - freezing
  - freeze drying and freeze concentration

- modified atmosphere combined with low temperature cryovac.

### **2.17.23.1 Industrial refrigeration systems design fundamentals**

Evidence shall show an understanding of industrial refrigeration systems design fundamentals to an extent indicated by the following aspects:

a) Standards and codes

- AS1677, detailed understanding
- AS 3666, overview
- ozone protection regulations
- IIR Ammonia Data Book
- ANSI/IIR standards
- ANSI/ASHRAE Mechanical Refrigeration & IIR bulletins and standards (list will be provided by Rama)

b) Operating characteristics

- pH charts
- refrigerating effect, relate back to air and fluid coolers
- heat of compression, relate back to screw, rotary and reciprocating compressors
- heat rejected high side of the system, relate back to air cooled, evaporative, and water cooled condensers
- variable liquid refrigeration systems & liquid oversee systems
- required mass flow rate of refrigerant and volume flow rate at various points in system
- theoretical compressor power
- required condenser capacity

c) Major system components

- refrigerants, including R717 and R22
- secondary refrigerants
- component lubricant refrigerant compatibility
- evaporators
- condensers, cooling towers
- compressors
- expansion valves
- interconnecting piping and
- isolating valves
- pilot operated valves
- defrost system components for air, water, recycled water, hot gas, electric methods
- refrigerant accumulators and liquid pumps

### **2.17.23.2 Industrial refrigeration system design**

Evidence shall show an understanding of industrial refrigeration system design to an extent indicated by the following aspects:

a) Standards

- AS1677

- ANSI/IIAR Standards
  - ANSI/ASHRAE Standards
  - IIAR Bulletins
- b) Moderate and low temperature industrial refrigeration systems
- revise direct, flooded and pumped liquid recirculation systems
  - evaporators
  - multi-staged compression
  - direct staging
  - cascade staging
  - compound compressors
  - desuperheaters, liquid injection
  - direct expansion intercoolers
  - open and closed intercoolers
  - basic designs of accumulators/intercooler vessels
  - oil cooling methods
  - oil stabilisation, return and oil recovery in flooded systems
- c) Multiple evaporators and multiple compressors
- parallel evaporators
  - multiple temperature systems
  - evaporator pressure regulators
  - temperature control methods
  - parallel compressors
  - pipework layout
  - methods of establishing pressure drop in dry and wet suction lines
- d) Indirect refrigeration systems
- classification according to AS1677
  - applications
  - evaporators
  - heat exchangers, types, construction, selection
  - secondary refrigerants
  - brines
  - antifreeze solutions
- e) Flooded systems
- applications
  - equipment
  - accumulators
  - level controls
  - liquid recirculation pumps
  - liquid pressure relief valve
- f) Cryogenic systems
- applications and equipment
  - system components
  - refrigerants

- design safety
  - economics
  - cascade systems
- g) Basic control sequences
- maintaining evaporator conditions
  - staging and suction pressure control
  - maintaining condenser conditions
  - control of intermediate pressure, methods of industrial refrigeration compressor capacity control

#### **2.17.24 Commercial air conditioning systems design**

Evidence shall show an understanding of commercial air conditioning systems design to an extent indicated by the following aspects:

- a) Design parameters for single-storey buildings (eg offices, restaurants, hotels, bars)
- Customer and objective
  - Customer concept of environment desired
  - Economics
  - Client brief
- b) Relevant design criteria
- Building purpose, location, orientation and shape
  - External environment ambient conditions
  - Internal load diversity
  - Thermal capacity behaviour
  - Thermal load (full and partial)
- c) Zoning and building usage
- Space and building
  - Occupancies, single purpose, multi-purpose
- d) System selection criteria
- Economics
  - Environment
  - Control requirements
  - Existing structures
  - New structures
  - System components
  - Space for equipment and system
  - Selection of appropriate system, equipment, ductwork and components
- e) Systems and applications
- Design features, engineering and selection procedures for direct expansion air conditioning systems:
  - RAC's, split systems, package units
  - Free blow and ducted fan coil units
  - Cooling, heat pump and electric heating

**2.17.25 Statics**

Evidence shall show an understanding of statics to an extent indicated by the following aspects:

## a) Force and gravity

- the concept of force
- characteristics of force
- basic principles
- rectangular components of force
- graphical addition of forces
- mathematical addition of forces
- universal gravitation
- variation in gravity
- weight as force
- types of supports

## b) Equilibrium of concurrent coplanar forces

- concurrent forces
- conditions of equilibrium
- the equilibrant force
- support reactions
- the three force principle
- two and three force bodies

## c) Moment and torque

- moment of force
- addition of moments
- equilibrium of moments
- torque
- equivalent force moment systems

## d) Equilibrium of non-concurrent coplanar forces

- conditions of equilibrium
- calculation of beam reactions (simply supported, cantilever, point load, udi, self-weight)
- resultant of non-concurrent forces

## e) Friction

- coefficient of frictional resistance
- the laws of dry sliding friction
- the angle of friction
- the angle of repose
- friction on inclined planes
- resultant of normal reaction and friction force
- wedges
- stability - overturning versus sliding

## f) Couples

- definition
  - applications
  - moment of a couple
  - replacing a force with a force and a couple
- g) Forces in frames
- general principles
  - method of joints
  - combined force polygon (Maxwell diag)
  - method of sections
  - method of members

### 2.17.26 Commercial refrigeration system design

Evidence shall show an understanding of commercial refrigeration system design to an extent indicated by the following aspects:

a) Commercial refrigeration system types

- medium and low temperature applications
- operating conditions
- system operating and service requirements
- refrigerant types
- components
- multiple evaporator systems
- multiple temperature systems
- multiple compressor (rack) systems
- two stage compressors
- multiplex systems
- defrost requirements and methods
- electric defrost systems
- hot gas defrost systems
- cool gas defrost systems

b) Manufacturer's data

- rating tables
- selection tables
- catalogues.

c) Operating characteristics

- Effects of temperature glide with blended refrigerants,
- Ph Charts,
- Refrigerating Effect,
- Heat of compression,
- Heat Rejected on High Side of the System,
- Required mass flow rate of refrigerant,
- Volume flow rate at various points in system,

- Theoretical compressor power,
  - Required condenser capacity.
- d) Review automatic controls
- refrigerant regulating valves
  - solenoid valves
  - expansion valves
  - pressure regulating valves
  - cycling controls
  - pressure-stats
  - thermo-stats
  - defrost controls
  - monitoring and alarm controls
  - energy management systems
  - refrigeration automation systems
  - control strategies
  - control modes

### **2.17.27 Air conditioning system design**

Evidence shall show an understanding of air conditioning system design to an extent indicated by the following aspects:

- a) Design parameters for multi-storey building
- customer and objective
  - customer concept of environment desired
  - economic
  - client brief
- b) Relevant design criteria
- building purpose, location, orientation and shape
  - external environment ambient conditions
  - internal load diversity
  - thermal capacity behaviour
  - thermal load (full and partial)
- c) Zoning and building usage
- space and building
  - occupancies, single purpose, multi-purpose
- d) System selection criteria
- economics
  - environment
  - control requirements
  - existing structures
  - new structures
  - system components
  - space for equipment and system

- selection of appropriate system
- e) System and applications
  - design features, engineering procedures and controls for:
  - direct expansion - self contained room/zone, heat pump, multi-zone fan-coils, central station
  - all water - room fan-coil
  - all-air - constant volume variable temperature, face and bypass, reheat, constant temp variable volume, constant volume induction, dual-duct, dual-conduit
  - air water - induction unit, primary air fan- coil
- f) HVAC energy conservation techniques
  - heat recovery systems
  - night cycle
  - optimum stop/start
  - purge cycles
  - chiller/boiler/cooling tower sequencing
  - economy cycles (based on temperature or enthalpy)
  - supply air reset
  - supply water reset
  - condenser water temperature reset
  - power demand control
  - load limiting
  - load shedding
  - set point relaxation
  - ventilation cycles
  - plant - fixed OA to economy, boiler to electric reheat, constant volume to VAV etc.
  - cost-benefit (payback)

### **2.17.28 Psychrometrics - advanced**

Evidence shall show an understanding of advanced psychrometrics to an extent indicated by the following aspects:

- a) Complex psychrometric processes
  - revise sensible cooling and heating and evaporative (adiabatic) cooling
  - cooling and dehumidification
  - cooling and dehumidification with high latent load
  - cooling and dehumidification all out door air
  - cooling and dehumidification all out door air with dehumidified air requirements less than supply air
  - cooling with evaporative humidification
  - cooling with near isothermal humidification
  - spray process to include cooling and dehumidification, cooling and humidification with heated spray water, heating and humidification.
  - partial load processes
  - reheat

- bypass of, RA only and mix of RA & OA
- variable air volume
- variable coil effective surface temperature
- split coil, horizontal, vertical and intertwined.
- b) System performance
  - saturation efficiency of sprayers
  - system capacity calculated from air quantity and enthalpy change
- c) Required plant capacity and airflow rates
  - effects of coil bypass factor and ADP
  - calculation of dehumidified air quantity, using both TSH and ERSH methods.
- d) Recap on psychrometrics formulae and charts
  - properties of air
  - gas constants
  - derivation of air constants
  - combined gas laws
  - Dalton’s law of partial pressures
  - Carrier’s equation
  - psychrometric property tables
  - psychrometric charts
  - air mixing equations
  - air quantity equations
  - indirect evaporative coolers
  - analysis of cooling coil selection and performance
  - psychrometric analysis of:
    - air conditioning in tropics
    - all outdoor air
    - LCV/HWF systems
    - psychrometric analysis using equations and tables

### **2.17.29 Exhaust systems design**

Evidence shall show an understanding of exhaust systems design to an extent indicated by the following aspects:

- a) Relevant codes and regulations
  - health and safety
  - noise
  - smoke
  - fire
  - hazard identification
- b) System types
  - applications
  - application flow charts
  - system requirements

- hazard identification
  - effluent types and removal
  - relationship with smoke spill systems
  - supply air dilution applications
  - natural ventilation applications
  - fan assisted exhaust applications
  - replenishment of exhaust air
  - system components
- c) Duct design
- static, velocity, total pressure
  - pressure drop
  - fouling
  - transitions
  - elbows
  - fan position and mounting
  - noise and noise attenuation
  - requirements for access and maintenance
  - system integrity
- d) Fan and motor selection
- applications
  - suitable fan types
  - motor rating and suitability
  - balancing the fan duct system
  - flame proofing
- e) Filters and filter selection
- types and applications
  - capture velocity
- f) Outlet design and location
- prevailing winds
  - position relative to air intakes
  - weather and bird proofing
- g) Cycling/operation control
- applications
  - code/regulation requirements
  - monitoring of contaminants
  - contaminant detection
  - sensors
  - variable speed fans
  - flame proofing of control equipment

### **2.17.30 Heating systems design**

Evidence shall show an understanding of heating systems design to an extent indicated by

the following aspects:

a) Heating techniques:

- electric resistance heaters
- hot water boilers
- steam boilers
- refrigeration heat pump
- heat reclaim
- thermal storage systems
- comparative heating costs
- Australian Standards

b) Heating equipment selection

- double bundle condensers
- heat pumps
- boilers
- coils
- expansion tanks
- pumps, characteristics curves
- control valves, types, flow diagrams,
- air purge points
- water treatment
- pipe anchors and expansion joints

c) Hydronic system configuration

- piping configurations
- single pipe closed circuit
- two pipe closed circuit
- direct return
- three pipe closed circuit with reversed return
- three way diverting valves
- risers and headers
- component location
- evaluation of piping configurations
- capital cost
- owning and operating costs
- noise vibration
- maintenance
- future expansion
- commissioning and balancing
- operating characteristics
- cavitation

d) System pipe sizes

- pipe dynamic and friction losses for different materials
- fitting pressure losses for different materials

- thermal heat losses
- bare, insulated and underground pipes

### **2.17.31 Hydronic system design**

Evidence shall show an understanding of hydronic system design to an extent indicated by the following aspects:

a) Principles of fluid flow

- properties of fluids
- flow of ideal fluids
- fluid flow equipment
- Bernoulli Theorem
- fluid flow in pipes

b) Pressure loss and static head - calculation

- flow throughout system
- pressure throughout system
- friction losses
- pressure loss charts for: copper, steel, UPVC
- dynamic losses
- fitting pressure losses
- fitting interaction
- total losses
- calculating system (static and dynamic) head

c) Pump performance and selection

- pump classification and types
- pump performance terminology, discharge, head, power, efficiency, speed, net positive suction head required
- pump performance curves
- pump laws
- system head and 'K' factor
- balance points
- energy considerations
- pump cavitation
- calculation of net positive suction head available
- Series and parallel operation

d) Pipe sizing

- maximum friction rate
- erosion and equipment life
- industry standards
- recommended system water velocities
- economic balance - first cost and operating cost

### **2.17.32 Sources of technical development and processes for their adoption**

Evidence shall show an understanding of sources of technical development and processes for their adoption to an extent indicated by the following aspects:

- a) Sources of information on alternative or new technologies
  - Industry organisations
  - Industry technical journals
  - Government and private research papers/literature
  - Manufacturers' bulletins
- b) Comparison of technical data from different manufacturers
- c) Evaluating performance benefits and limitations of new and developed technologies for given applications, encompassing:
  - Capital cost benefits
  - Operations efficiency
  - Risk hazardous and issues related to environmental and health and safety
  - Functionality
- d) Processes to facilitate adoption

Note:

Research; analyses; reporting; recommending; and the like, utilising a range of techniques, processes and technologies

### **2.17.33 Refrigeration systems**

Evidence shall show an understanding of introduction to refrigeration to an extent indicated by the following aspects:

- a) Major components, type and functions:
  - evaporators
  - compressors
  - expansion devices
  - ancillary components
  - refrigerants
- b) System operation and performance:
  - thermodynamic properties of refrigerants
  - pressure enthalpy charts
  - the refrigerant cycle
  - the refrigerant cycle represented on pH charts
  - introduction to refrigerating effect, heat of compression, heat rejected on high side, co-efficient of performance, liquid sub-cooling suction superheating
  - effects on performance of changing operating pressures, liquid sub-cooling, suction superheating
- c) Application of refrigeration:
  - introduction to industrial refrigeration, specific system component types and refrigerants applied.
  - scope of commercial refrigeration, specific system component types and refrigerants applied
- d) Refrigerated enclosures and cabinets:
  - merchandising and display cabinets:

- deep freeze meat
  - dairy
  - fruit and vegetable
  - multi-deck display
  - single deck
  - well type
  - island cases
  - glass door
  - reach door
  - reach in merchandisers
  - defrosting methods
  - cold rooms and freezer rooms
    - types and construction
    - insulation
    - vapour barrier
    - frost heave
    - interior fittings
    - location of equipment
    - defrosting methods
    - cold tracking
    - trace heating
  - storage conditions
    - temperature
    - relative humidity
    - air velocity
    - air patterns
    - load limits
- e) Air conditioning chills & DX coil types and construction

### **2.17.34 Air conditioning systems**

Evidence shall show an understanding of air conditioning to an extent indicated by the following aspects:

a) Occupational health requirements:

- WH&S requirements
- BCA requirements
- AS1668 parts 1 & 2
- AS3666
- noise and vibration
- air quality
- sick building syndrome

b) Operating requirements:

- ventilation
- air distribution

- terminal velocity
- temperature
- relative humidity
- air quality
- noise
- basic psychrometrics
- c) Operating modes
  - ventilation
  - evaporative cooling
  - ventilation and cooling
  - ventilation and heating
  - dehumidification
  - dehumidification
  - dehumidification and reheat
  - humidification
- d) Operating terminology/characteristics:
  - throw, drop
  - primary and secondary air
  - coanda effect
- e) HVAC system components and functions:
  - fans
  - ducting
  - registers
  - dampers
  - filters
  - cooling coils
  - heating coils
  - induction units
  - fan coil units
  - terminal units
  - humidifiers, pumps and sprayers
  - hydronic systems and components
- f) Applications and construction of air conditioning systems:
  - applications
    - residential, commercial, low and high rise, industrial ventilation and air conditioning
  - packaged plant
    - RACs, split systems (wall and floor console, ceiling fan coil), wall facia, roof top, reverse cycle option central station plant
  - all air systems, constant volume variable temperature, constant temperature variable volume, air/water systems
  - all water system, multi-zoning, thermal storage systems
  - basic air conditioning system diagrams
  - duct layout

- hydronic layout
- unit/conditioner drawings
- g) HVAC control systems:
  - basic principles
  - terminology
  - symbols and diagrams
  - basic applications

### 2.17.35 Applied psychrometrics

Evidence shall show an understanding of applied psychrometrics to an extent indicated by the following aspects:

- a) Fundamentals and terms
  - sensible heat factor (conditioned space and grand total)
  - quantity of air
  - effective surface temperature
  - bypass factor
- b) Coil characteristics
  - processes
  - sensible cooling
  - cooling, dehumidification
  - sensible heating
- c) Spray processes
  - saturation efficiency
  - processes
  - adiabatic/evaporative cooling
  - cooling & humidification
  - sensible cooling
  - cooling and/or humidification
  - chemical dehumidification process: dehumidification & heating
  - cooling tower characteristics: humidification & cooling
  - indirect evaporative cooling process
- d) System analysis
  - partial load
  - reheat control
  - bypass control
  - volume control
  - dump back systems
  - low velocity coils
- e) Psychrometric formulae and charts
  - properties of air
  - gas constants
  - derivation of air constants

- combined gas laws
- Dalton’s law of partial pressures
- Carrier’s equation
- psychrometric property tables
- air mixing equations
- air quantity equations

### **2.17.36 Ventilation systems**

Evidence shall show an understanding of ventilation to an extent indicated by the following aspects:

- a) Requirements necessary to supply/install/maintain a ventilation/air conditioning system. (not design)
- b) Fan classifications and applications.
- c) Identification and correct usage of various items of test equipment.
- d) Procedures to be followed when conducting an air balance.
- e) Filtration applications and service requirements of ventilation - air conditioning systems.
- f) Noise and vibration sources in a ventilation – air conditioning system.
- g) Site work/architectural drawings.
- h) Auxiliary equipment.
- i) Layout and zoning of duct work system.
- j) Occupational health aspects.

### **2.17.37 Beverage vending cabinets**

Evidence shall show an understanding of beverage vending cabinets to an extent indicated by the following aspects:

- a) Types, construction and operation of refrigerated drink vending cabinets encompassing:
  - Coin operated mechanism on the refrigerated vending cabinet.
  - Electro-mechanical mechanism on the coin operated vending cabinet.
  - Electronic mechanism on the coin operated vending cabinet.
- b) Specialised components and features required for the operation of a coin operated refrigerated vending cabinet encompassing:
  - Electrical / electronic control circuitry.
  - Air distribution and air flow curtains.
  - Lighting arrangements.
- c) Installation requirements for a refrigerated coin operated vending cabinet encompassing:
  - Location requirements
  - Access requirements and avoidance obstruction
  - Power supply and electrical service requirements
- d) System operating conditions for a coin operated refrigerated vending cabinet.
- e) Commissioning, service and maintenance procedures of a refrigerated coin operated vending cabinet encompassing:
  - Electrical / electronic control devices checks and adjustments.
  - Air flow checks and adjustments.

- Mechanical checks and adjustments
- Typical faults

## 2.18 Safety

### 2.18.1 Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

- a) The basic legal requirements covering occupational health and safety in the workplace encompassing:
  - general aims and objectives of the relevant state or territory legislation relating to OHS.;
  - employer and employee responsibilities, rights and obligations
  - major functions of safety committees and representatives); and
  - powers give to Occupational Health and Safety Inspectors.
- b) The requirements for personal safety in the workplace encompassing:
  - the safety precautions that are required to ensure personal safety in the workplace
  - potential hazards in relation to improper industrial housekeeping; and
  - sources of pollution in an engineering environment and outline control measures
- c) Workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention encompassing:
  - safety checklist for a typical workplace environment,
  - identifying and reporting potential workplace hazards
  - methods of prevention of safety hazards within a typical workplace environment
- d) working safely with electrical tools or equipment encompassing:
  - causes of electrical accidents and state the effects that electric shock can cause.);
  - purpose of circuit protection devices, such as fuses, circuit breakers and Residual Current Devices (RCDs), and
  - safe isolation of an electrical supply.
- e) emergency procedures for the rescue of an electric shock victim equipment
- f) emergency first aid for an electric shock victim

Note:

Emergency first aid is limited to first-on-the scene assistance to a victim of electric shock , and basics of CPR.

### 2.18.2 Electrical safe working practices

Evidence shall show an understanding of working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage, low-voltage and high-voltage hazards and high-current hazards. The following aspects indicate the extent of understanding required:

- a) Risk management and assessment of risk encompassing:
  - Principle and purpose of risk management, and
  - Processes for conducting a risk assessment
- b) Hazards associated with low-voltage, extra-low voltage and high-currents encompassing:
  - Arrangement of power distribution and circuits in an electrical installations
  - Parts of an electrical system and equipment that operate at low-voltage and extra-

low voltage,

- Parts of an electrical system and equipment where high-currents are likely.

Risks and control measures associated with high-voltage encompassing:

- Parts of an electrical system and equipment that operate at high-voltage,
- The terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of high-voltage, and
- Control measures used for dealing with the hazards of high-voltage.

d) Optical fibre safety encompassing:

- Coherent optical sources and joining procedures
- Laser safety class 3a devices or their replace

e) Risks and control measures associated with low voltage encompassing:

- Risks associated with modifying electrical installations, fault finding, maintenance and repair.
- Control measures before, while and after working on electrical installations, circuits or equipment.
- Isolation and tagging-off procedures.
- Risks and restrictions in working live.
- Control measures for working live.

f) Risks and control measures associated with harmful dusts and airborne contaminants.

Note

Sources include thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials.

g) Safety, selection, use, maintenance and care of test equipment encompassing:

- Safety characteristics of electrical testing devices,
- Safe use of electrical testing device, and
- Checks and storage methods for maintaining the safety of testing devices.

### **2.18.3.1 Refrigeration and air conditioning safe working practices**

Evidence shall show an understanding of working safely with refrigeration and air conditioning systems through the application of risk management principles and control measures for dealing with refrigerant gas hazards and health hazards associated with open water systems. The following aspects indicate the extent of understanding required.

a) Risk management and assessment of risk encompassing:

- Principle and purpose of risk management, and
- Processes for conducting a risk assessment

b) Hazards and risk control measures associated with refrigeration/air conditioning components and systems encompassing:

- Harmful effects of refrigerant gases
- Control measures for the use, handling and storage of refrigerants
- Risks associated with modifying refrigeration/air conditioning installations, fault finding, maintenance and repair.
- Control measures before, while and after working on refrigeration/air conditioning components and systems.

c) Safety, selection, use, maintenance and care of test equipment encompassing:

- Safety characteristics of refrigeration/air conditioning testing/measuring devices,

- Safe use of testing/measuring device, and
- Checks and storage methods for maintaining the safety of testing/measuring devices.

### 2.18.3.2 Split air conditioning systems safe working practices

Evidence shall show an understanding of working safely on or around split air conditioning systems through the application of risk management principles and control measures for dealing with electrical, chemical and other hazards. The following aspects indicate the extent of understanding required.

- a) Risk management and assessment of risk encompassing:
- Principle and purpose of risk management, and
  - Processes for conducting a risk assessment
- b) Hazards and risk control measures associated with split air conditioning components and systems encompassing:
- Harmful effects of refrigerant gases
  - Control measures for the use of refrigerants
  - Risks associated with installations of split air conditioning systems
  - Control measures before, while and after installing on split air conditioning systems.
- c) Safety, selection, use, maintenance and care of tools and equipment encompassing:
- Safety characteristics of refrigeration/air conditioning testing/measuring devices,
  - Safe use of testing/measuring device, and
- d) Checks and storage methods for maintaining the safety of testing/measuring devices.

### 2.18.4 Remote area power supply safe working practices

Evidence shall show an understanding of working safely on or around remote area power supplies (RAPS) through the application of risk management principles and control measures for dealing with hazards typical of RAPS systems. The following aspects indicate the extent of understanding required.

- a) Types of hazards in and around remote area power supplies

Note:

In addition to the safety hazards found in most workplace RAPS systems are likely to have the hazards related to electricity supplied from more than one source, rotating machines, fuels and oils, exhaust fumes, and acids and flammable gases from batteries.

- b) Measures for dealing with hazards in and around remote area power supplies encompassing:

- Purpose and methods for isolation and de-energisation of power supplies

Note:

Isolation and de-energisation includes processes for preventing generator from automatically starting and isolating photo voltaic arrays, wind driven generators, battery and inverter power sources prior to and during maintenance & repair activities

- Purpose and method for ensuring adequate area ventilation

Note:

Adequate ventilation is in reference to exhaust fumes from generator prime movers and safe fuel storage.

- Safe fuel storage practices
- Methods for limiting access to plant areas

- Types and locations of safety signs.
- c) Purpose and use of personal protective equipment

### **2.18.5 Rail safe working practices**

Evidence shall show an understanding of working safely in rail networks and rail systems through the application of risk management principles and control measures for dealing with track and equipment hazards. The following aspects indicate the extent of understanding required:

- a) Rail enterprise safety standard and procedures
- b) Rail safe working requirements
- c) Possessions protection and management

### **2.18.6 Hazardous area safe working practices**

Evidence shall show an understanding of working safely in hazardous areas to an extent indicated by the following aspects:

- a) The main features and purpose of a ‘clearance to work’ system;
- b) Typical safety procedures that should be followed before entering a hazardous area;
- c) The purpose of gas detectors and their use and limitations encompassing:
  - Effects of temperature on gas and vapour detection;
  - Frequency of monitoring for presence of gas or vapours, i.e. effects of temperature rise;
  - Factors affecting the accuracy of gas detectors, for example, contamination, condensation, temperature;
  - Safety in use of gas detectors, for example, ‘read and run concept’
- d) Safety measures to be taken when working in a hazardous area.
- e) The roles of the parties involved in the safety of hazardous areas encompassing:
  - common Acts and Regulations related to the safety of hazardous areas and the Authorities responsible for their implementation;
  - where assistance and further information can be obtained to assist persons with hazardous area responsibilities.

Note:

1. Examples include Standard bodies, experienced consultants;
2. Persons with hazardous area responsibilities include the hazardous area responsibilities of the owner of premises in which a hazardous area exists; the occupier of premises in which a hazardous area exists; enterprises and personnel engaged in installation and/or maintenance of explosion-protection systems; enterprises and personnel engaged in the classification of hazardous areas and/or design of explosion-protection systems; enterprises and personnel engaged in the overhaul, modification and/or assessment of explosion-protected equipment; enterprises and personnel engaged in the inspection of explosion-protection installations; manufacturers of explosion-protected equipment; designated authorities; insurers.

### **2.18.7 Instrumentation safe working practices**

Evidence shall show an understanding of working safely on or around process equipment through the application of risk management principles and control measures for dealing with hazardous materials and processes. The following aspects indicate the extent of understanding required.

- a) Risk management and assessment of risk encompassing:
  - Principle and purpose of risk management, and
  - Processes for conducting a risk assessment
- b) Hazards associated with processing and processed products, encompassing:
  - Types of materials encountered in instrumentation work
  - Hazardous materials
  - Hazardous areas
  - Safety and environmental consequences of uncontrolled hazardous materials
- c) Risk control measures associated with hazardous materials and hazardous areas
- d) Risk control measures associated with electrical equipment and systems.

#### **2.18.8.1 Occupational Health and Safety, supervisory responsibilities**

Evidence shall show an understanding of OHS enterprise responsibilities to an extent indicated by the following aspects:

- a) Provisions of relevant occupational health and safety legislation
- b) Principles and practice of effective occupational health and safety management
- c) Workplace hazards, range and selection of control measures
- d) Organisational health and safety management systems and policies and procedures needed for legislative compliance
- e) Impact of characteristics and composition of the workforce on occupational health and safety management
- f) Relevance of occupational health and safety management to other organisational management policies, procedures and systems.
- g) Analysis of entire work environment and judge occupational health and safety interventions
- h) Analysis of relevant workplace data
- i) Ability to assess resources needed for risk control.

#### **2.18.8.2 Occupational Health and Safety, enterprise responsibilities**

Evidence shall show an understanding of OHS enterprise responsibilities to an extent indicated by the following aspects:

- a) Provisions of relevant health and safety legislation
- b) Principles and practice of effective occupational health and safety management
- c) Management arrangements relating to regulatory compliance
- d) Enterprise hazards and risks, control measures and relevant expertise required
- e) Characteristics and composition of workforce and their impact on occupational health and safety management
- f) Relevance of enterprise management systems to occupational health and safety management
- g) Analysis of working environment and design of appropriate occupational health and safety management systems
- h) Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- i) Assess resources to establish and maintain occupational health and safety management systems.

### 2.18.9 Electronic safe working practices

Evidence shall show an understanding of working safely on or around electronic equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage, low-voltage and high-voltage hazards and high-current hazards. The following aspects indicate the extent of understanding required.

- a) Risk management and assessment of risk encompassing:
  - Principle and purpose of risk management, and
  - Processes for conducting a risk assessment
- b) Hazards associated with low-voltage, extra-low voltage and high-currents encompassing:
  - Parts of an electronic systems and equipment that operate at low-voltage and extra-low voltage,
  - Parts of an electronic systems and equipment where high-currents are likely.
- c) Risks and control measures associated with high-voltage encompassing:
  - Parts of an electronic systems and equipment that operate at high-voltage,
  - The terms used - ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of high-voltage, and
  - Control measures used for dealing with the hazards of high-voltage.
- d) Risks and control measures associated with low voltage encompassing:
  - Risks associated with installation, fault finding, maintenance and repair.
  - Control measures before, while and after working on electronic systems or equipment
  - Isolation and tagging-off procedures.
  - Risks and restrictions in working live.
  - Control measures for working live.
- e) Risks and control measures associated with the high levels of radiation encompassing:
  - RF hazards
  - Maximum exposure levels to RF
  - Maximum exposure to microwave radiation
- f) Optical fibre safety encompassing:
  - Coherent optical sources and joining procedures
  - Laser safety class 3a devices or their replace
- g) Safety, selection, use, maintenance and care of test equipment encompassing:
  - Safety characteristics of electrical testing devices,
  - Chemical cleaning solvents, glues and joining wastes used in electronics,
  - Safe use of electrical testing device, and
  - Checks and storage methods for maintaining the safety of testing devices.

### 2.18.10 Medical equipment safe working practices

Evidence shall show an understanding of working safely with medical equipment and treatment areas the application of risk management principles and control measures for dealing with infection hazards. The following aspects indicate the extent of understanding required:

- a) Risk management and assessment of risk encompassing:

- Principle and purpose of risk management, and
  - Processes for conducting a risk assessment
- b) Hazards associated with medical equipment, encompassing:
- Infections
  - Toxic materials
  - Electrical components
  - Radiation
- c) Risks and control measures associated with working with medical equipment

### **2.18.11 Fire protection equipment safe working practices**

Evidence shall show an understanding of working safely on or around fire protection equipment through the application of risk management principles and control measures for dealing with electrical, chemical and other hazards. The following aspects indicate the extent of understanding required.

- a) Risk management and assessment of risk encompassing:
- Principle and purpose of risk management, and
  - Processes for conducting a risk assessment
- b) Hazards associated with low-voltage, extra-low voltage and high-currents encompassing:
- Arrangement of power distribution and circuits in an electrical installations
  - Parts of an electrical system and equipment that operate at low-voltage and extra-low voltage,
  - Parts of an electrical system and equipment where high-currents are likely.
- c) Risks and control measures associated with fire protection equipment encompassing:
- Procedures for isolating/reinstating and disconnection and reconnection of supplies in excess of extra-low voltage
- Note.
1. Isolation and disconnection and reconnection is required to be performed by an appropriately qualified and authorised persons.
- Arrangements for isolating/reinstating fire protection systems to inhibit back-to-base signals to monitoring station.
  - Arrangements for isolating/reinstating fire protection systems to inhibit alarms operating fire protection suppression equipment
  - Arrangements for isolating/reinstating sections or parts of a fire protection system to inhibit alarms during building maintenance or system testing.
  - Interface arrangements to isolate control functions between different fire protection building service systems
  - Documentation and licensing requirements for working on fire protection systems
  - Identification of personal and environmental hazards in working on fire protection systems.
  - Control measures used for dealing with the hazards related to fire protection systems

### **2.18.12 Business equipment servicing safe working practices**

Evidence shall show an understanding of business equipment servicing safe working practices to an extent indicated by the following aspects:

- a) Risk management and assessment of risk encompassing:
  - Principle and purpose of risk management, and
  - Processes for conducting a risk assessment
- b) Hazards associated with low-voltage, extra-low voltage and high-currents encompassing:
  - Parts of an electronic systems and equipment that operate at low-voltage and extra-low voltage,
  - Parts of an electronic systems and equipment where high-currents are likely.
- c) Risks and control measures associated with high-voltage encompassing:
  - Parts of an electronic systems and equipment that operate at high-voltage,
  - The terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of high-voltage, and
  - Control measures used for dealing with the hazards of high-voltage.
- d) Risks and control measures associated with low voltage encompassing:
  - Risks associated with installation, fault finding, maintenance and repair.
  - Control measures before, while and after working on electronic systems or equipment
  - Isolation and tagging-off procedures.
  - Risks and restrictions in working live.
  - Control measures for working live.

### **2.18.13 Appliance servicing working practices**

Evidence shall show an understanding of appliance servicing working practices to an extent indicated by the following aspects:

- a) Risk management and assessment of risk encompassing:
  - Principle and purpose of risk management, and
  - Processes for conducting a risk assessment
- b) Hazards associated with low-voltage, extra-low voltage and high-currents encompassing:
  - Parts of an electronic systems and equipment that operate at low-voltage and extra-low voltage,
  - Parts of an electronic systems and equipment where high-currents are likely.
- c) Risks and control measures associated with high-voltage encompassing:
  - Parts of an electronic systems and equipment that operate at high-voltage,
  - The terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of high-voltage, and
  - Control measures used for dealing with the hazards of high-voltage.
- d) Risks and control measures associated with low voltage encompassing:
  - Risks associated with installation, fault finding, maintenance and repair.
  - Control measures before, while and after working on electronic systems or equipment
  - Isolation and tagging-off procedures.
  - Risks and restrictions in working live.
  - Control measures for working live.

#### 2.18.14 Aerial safety practice

Evidence shall show an understanding of working safely on or around aerial cabling through the application of risk management principles and control measures for dealing with electrical hazards. The following aspects indicate the extent of understanding required.

- a) Risk management and assessment of risk encompassing:
  - Principle and purpose of risk management, and
  - Processes for conducting a risk assessment
- b) Hazards associated with low-voltage, extra-low voltage and high-currents encompassing:
  - Parts of an electronic systems and equipment that operate at low-voltage and extra-low voltage,
  - Parts of an electronic systems and equipment where high-currents are likely.
- c) Risks and control measures associated with high-voltage encompassing:
  - Parts of an electronic systems and equipment that operate at high-voltage,
  - The terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of high-voltage, and
  - Control measures used for dealing with the hazards of high-voltage.
- d) Risks and control measures associated with low voltage encompassing:
  - Risks associated with installation, fault finding, maintenance and repair.
  - Control measures before, while and after working on electronic systems or equipment
  - Isolation and tagging-off procedures.
  - Risks and restrictions in working live.
  - Control measures for working live.

#### 2.18.15 Trenching safety practices

Evidence shall show an understanding of working safely on or around cable trenches through the application of risk management principles and control measures for dealing with trenching hazards. The following aspects indicate the extent of understanding required.

- a) Identification of trenching conditions
- b) Notification of relevant authorities/utilities
- c) Digging and trenching equipment safety
- d) Methods of shoring
- e) Public safety
- f) Personal safety equipment
- g) Permits

#### 2.18.16 Documenting hazards and identifying risks

Evidence shall show an understanding of occupational hazard identification, risk assessment and control measures to eliminate or mitigate the risk to an extent indicated by the following aspects:

- a) Hazard identification by work-site inspections involving visual checks, looking at ways work can be carried out, consulting with others, review of prior incident reports, using manufactures equipment details
- b) Recording hazards and assessing the risk in relation to voltage levels, nature of the job, number of people involved, plant, machinery and equipment involved, working

- environment and conditions, capability and experience and age of the people doing the work and foreseeable abnormal conditions.
- c) Determine the degree of the risk in relation to high (potential to kill or permanent disability), medium (potential to cause an injury or illness of a permanent nature) or low (potential to cause a cause minor injury requiring first aid but no permanent disability)
  - d) Identify control measures so as to eliminate the risk (discontinue activity, use different approaches to the work, use different equipment or fix faulty machinery), redesign the equipment or work process and/or adopt administrative procedures and use of personal protective equipment.
  - e) Monitor and review processes to ensure control measures remain valid, are updated should an accident occur, unforeseen hazards are identified and/or work practices, equipment or material change.
  - f) Principles and legal responsibilities of respective parties in managing and administering hazards and assessing risk in the workplace; with particular attention to elimination and mitigation measures, and documentation requirements for identifying risks and documenting hazards.
  - g) Practices and processes associated with implementing hazards identification and risk management

### **2.18.17 Powerline safety practices**

Evidence shall show an understanding of working safely on or around powerlines through the application of risk management principles and control measures for dealing with hazards typical around powerlines. The following aspects indicate the extent of understanding required.

- a) Items of protective apparatus and apparel used by lineworkers and states their applications.
- b) Methods of carrying, erecting, collapsing and lower an extension ladder
- c) Maintenance requirements for wood and fiberglass ladders.
- d) Methods of climbing and working on an overhead structure encompassing:
  - determining whether a pole is safe to climb.
  - inspecting lineworkers body belt.
  - knots and hitches appropriate to the requirements of a lineworker.
- e) Procedures for establishing an effective road traffic management scheme encompassing:
  - purpose of traffic management in accordance with relevant statutory requirements.
  - lineworkers responsibilities in accordance with relevant statutory and electricity supply industry requirements.
  - procedure used to provide an effective traffic management scheme.
  - use of a two-way radio.
- f) Application of various fire fighting mediums and operation equipment used to extinguish small fires compassing:
  - extinguishing mediums for various types of fires.
  - precautions for personal protection when fighting small fires.
  - selection and operation of the appropriate portable fire extinguisher for a specific type of fire.
- g) Rescue procedures for victims who become incapacitated encompassing:
  - procedure for rescuing a person from heights.
  - procedure to rescue a person from confined spaces

## 2.19 Special requirements

### 2.19.1 Hazardous areas and explosion-protection principles

Evidence shall show an understanding of hazardous areas and explosion-protection principles to an extent indicated by the following aspects:

- a) Properties of combustible substances and their potential to create an explosive hazard encompassing:
- condition in the workplace that will lead to an explosion;
  - the terms ‘combustion’, ‘ignition’ and ‘propagation’;
  - explosive range of substances encountered in the workplace i.e. LEL/UEL;
  - explosive parameters of substances as given in tables of substance properties
- Note:  
Combustible materials are gases, vapours (from liquids), and dusts; flash point.
- the difference between gases and vapours; and
  - the toxic nature of gases and vapours and potential harmful consequences.
- b) The nature of hazardous areas encompassing:
- the Standards definition of a ‘hazardous area’;
  - the recommended methods for classifying the type and degree of explosion hazard in an area;
  - hazardous area classifications as defined by Standards; and
  - factors that are considered when a hazardous area is classified.
- c) The basics of how explosion-protection is achieved by the methods of exclusion, containment, energy limitation, dilution, avoidance of ignition source.
- d) Occupational Health and Safety responsibilities related to hazardous areas encompassing:
- the main features and purpose of a ‘clearance to work’ system;
  - typical safety procedures that should be followed before entering a hazardous area;
  - the purpose of gas detectors and their limitations;
  - effects of temperature on gas and vapour detection;
  - frequency of monitoring for presence of gas or vapours, i.e. effects of temperature rise;
  - factors affecting the accuracy of gas detectors, for example, contamination, condensation, temperature;
  - safety in use of gas detectors, for example, ‘read and run concept’
  - the safety precautions to be taken when working in a hazardous area.
- e) The roles of the parties involved in the safety of hazardous areas encompassing:
- common Acts and Regulations related to the safety of hazardous areas and the Authorities responsible for their implementation;
  - where assistance and further information can be obtained to assist persons with hazardous area responsibilities, for example, Standard bodies, experienced consultants; and
  - the hazardous area responsibilities of the owner of premises in which a hazardous area exists; the occupier of premises in which a hazardous area exists; enterprises and personnel engaged in installation and/or maintenance of explosion-protection systems; enterprises and personnel engaged in the classification of hazardous areas

and/or design of explosion-protection systems; enterprises and personnel engaged in the overhaul, modification and/or assessment of explosion-protected equipment; enterprises and personnel engaged in the inspection of explosion-protection installations; manufacturers of explosion-protected equipment; designated authorities; insurers.

### **2.19.2 Explosion-protected equipment**

Evidence shall show an understanding of the principles of the following explosion-protection techniques: Flameproof (Ex ‘d’); Increased safety (Ex ‘e’); Non-sparking (Ex ‘n’); Intrinsic safety (Ex ‘i’) and Pressurization (Ex ‘p’) for gas atmospheres and Dust-exclusion enclosures (Ex ‘tD’); Pressurization (Ex ‘pD’); Encapsulation (Ex ‘mD’); and Intrinsic safety (Ex ‘iD’) for dusts. The following aspects indicate the extent of understanding required:

- a) The principles of each explosion-protection technique, the methods used and how each technique works.
- b) How explosion-protected equipment is identified by the ‘Ex’ symbol marked on the equipment, including old equipment and equipment certified in another country.
- c) Visible conditions or actions that would void the explosion-protection provided by a particular technique.

### **2.19.3 Flameproof (Ex‘d’) explosion-protection technique**

Evidence shall show an understanding of the characteristic and application of Flameproof (Ex ‘d’) explosion-protection technique to an extent indicated by the following aspects:

- a) The purpose and characteristics of the design features of apparatus and circuits protected by the flameproof (Ex ‘d’) technique.

Note:

Examples of characteristics and design features are flame paths, integrity under pressure, pressure piling, and enclosure entries.

- b) Typical situations where the flameproof explosion-protection technique is used;
- c) Actions or conditions that would void the protection provided the Flameproof technique; and
- d) The use of Standards in determining the requirements to which the design of the flameproof explosion-protected apparatus shall comply.

### **2.19.4 Increased safety (Ex‘e’) explosion-protection technique**

Evidence shall show an understanding of the characteristic and application of Increased safety (Ex ‘e’) explosion-protection technique to an extent indicated by the following aspects:

- a) The purpose and characteristics of the design features of apparatus and circuits protected by the Increased safety (Ex ‘e’) technique.

Note:

Examples of characteristics and design features are temperature rise, maximum power dissipation, protection devices, certified components, creepage and clearance distances, absence of sparking contacts and enclosure entries.

- b) Typical situations where the Increased safety explosion-protection technique is used;
- c) Actions or conditions that would void the protection provided the Increased safety technique; and
- d) The use of Standards in determining the requirements to which the design of the

Increased safety explosion-protected apparatus shall comply.

### **2.19.5 Non-sparking (Ex'n') explosion-protection technique**

Evidence shall show an understanding of the characteristic and application of Non-sparking (Ex 'n') explosion-protection technique to an extent indicated by the following aspects:

a) The purpose and characteristics of the design features of apparatus and circuits protected by the Non-sparking (Ex 'n') technique.

Note:

Examples of characteristics and design features are creepage and clearance distances and restricted breathing.

b) Typical situations where the Non-sparking explosion-protection technique is used;

c) Actions or conditions that would void the protection provided the Non-sparking technique; and

d) The use of Standards in determining the requirements to which the design of the Non-sparking explosion-protected apparatus shall comply.

### **2.19.6 Intrinsic safety (Ex'i') explosion-protection technique**

Evidence shall show an understanding of the characteristic and application of Intrinsic safety (Ex 'i') explosion-protection technique to an extent indicated by the following aspects:

a) The purpose and characteristics of the design features of apparatus and circuits protected by the Intrinsic safety (Ex 'i') technique.

Note:

Examples of characteristics and design features are field devices, cables, safe area devices, earthing, entity versus integrated system concept, simple devices and interface devices and their parameters, segregation, infallible components, current and voltage limiting, creepage and clearance distances.

b) Typical situations where the Intrinsic safety explosion-protection technique is used;

c) Actions or conditions that would void the protection provided the Intrinsic safety; and

d) The use of Standards in determining the requirements to which the design of the Intrinsic safety explosion-protected apparatus shall comply.

### **2.19.7 Pressurization (Ex'p') explosion-protection technique**

Evidence shall show an understanding of the characteristic and application of Pressurization (Ex 'p') explosion-protection technique to an extent indicated by the following aspects:

a) The purpose and characteristics of the design features of apparatus and circuits protected by the Pressurization (Ex 'p') technique.

Note:

Examples of characteristics and design features are exclusion and dilution; purge periods, controlled shut down, monitoring and sources of internal release.

b) Typical situations where the pressurization explosion-protection technique is used;

c) Actions or conditions that would void the protection provided the pressurization technique; and

d) The use of Standards in determining the requirements to which the design of the pressurization explosion-protected apparatus shall comply.

### **2.19.8 Explosion-protection techniques for dusts**

Evidence shall show an understanding of the characteristic and application of Enclosures (Ex ‘tD’), Pressurization (Ex ‘pD’), Encapsulation (Ex ‘mD’), and Intrinsic safety (Ex ‘iD’) (for dusts) explosion-protection technique. The following aspects indicate the extent of understanding required.

a) The purpose and characteristics of the design features of apparatus and circuits protected by the techniques for dusts.

Note:

Examples of characteristics and design features are for Enclosures; Pressurization; Encapsulation; and Intrinsic safety.

- b) Typical situations where the each dust explosion-protection technique is used;
- c) Actions or conditions that would void the protection provided the each dust technique; and
- d) The use of Standards in determining the requirements to which the design of the dust explosion-protected apparatus shall comply.

### **2.19.9 Common characteristics of explosion-protection techniques**

Evidence shall show an understanding of the common characteristics of explosion-protection techniques to an extent indicated by the following aspects:

- a) The purposes of ‘temperature classification’ and ‘gas grouping/apparatus grouping’.
- b) Compliance plate markings.
- c) Limitations of non-metallic or specific alloy enclosures.
- d) The purpose of conformity and certification/approval for equipment used in hazardous areas.
- e) Environmental conditions that may impact on explosion-protection techniques.
- f) The principles and applications of other and mixed explosion-protection techniques.
- g) Other techniques include encapsulation Ex ‘m’; oil-immersion Ex ‘o’; powder-filling Ex ‘q’, ventilation Ex ‘v’ and special protection Ex ‘s’.

### **2.19.10 Hazardous areas installation and maintenance requirements**

Evidence shall show an understanding of hazardous area installation principles and maintenance techniques to an extent indicated by the following aspects:

- a) Preparation to install and maintain explosion-protected equipment in hazardous areas encompassing:
- OHS procedures to be followed when working in a hazardous area;
  - the significance of information provided on the certification documentation and schedules for a given item of explosion-protected equipment;
  - the typical contents of a site dossier and their purpose; and
  - limitations in the use of tools and testing devices in hazardous areas.
- b) The relationship between explosion-protected equipment, their certification documents and required locations given in specifications and layout drawings and/or written instructions encompassing:
- the purpose of markings on the compliance plate and certification documents for a given item of explosion-protected equipment;
  - matching explosion-protected equipment with certification documents and the equipment specified for an installation; and
  - the location the items of explosion-protected equipment for an installation from specifications and layout drawings and/or instructions.

- c) Installation Standards and requirements applicable to hazardous encompassing:
- the wiring systems permitted and not permitted in or above hazardous areas;
  - equipment not permitted in or above hazardous areas;
  - the regulations and Standards to which explosion-protected equipment and wiring must be installed in a hazardous area and how these are applied; and
  - the documentation required as a record of the installation process, including certification documentation.
- d) Maintenance procedures in hazardous areas that will ensure the integrity of the explosion-protection technique encompassing:
- the purpose of a maintenance schedule;
  - the purpose and extent of ‘visual’, ‘close’, ‘sample’ and ‘periodic’ inspections;
  - the features of each explosion-protection techniques that should be included in a maintenance schedule;
  - the impact of environmental conditions on explosion-protected equipment, including corrosion and frequency of maintenance; and
  - the documentation requirements for recording the maintenance process and results.

#### **2.19.11 Hazardous areas cable termination techniques**

Evidence shall show knowledge and skills in terminating cables suitable for use in hazardous areas to an extent indicated by the following aspects:

- a) Selecting compliant cable termination devices.
- b) Installing conduit seals to meet hazardous area requirements.
- c) Terminating MIMS cable in explosion-protected enclosures.
- d) Terminating steel wire armoured cable in explosion-protected enclosures.
- e) Terminating a cable with a barrier gland.
- f) Terminating an intrinsically safe cable in an enclosure.

#### **2.19.12 Hazardous areas detailed inspection techniques**

Evidence shall show an understanding of techniques used in auditing of site records and inspecting installations of explosion-protected and associated apparatus and hazardous area wiring. The following aspects indicate the extent of understanding required.

- a) Auditing of site records encompassing:
  - the documents that should be filed in a site dossier; and
  - procedures for auditing a site dossier;
- b) The relationship between the documentation held in a site dossier and the installed equipment encompassing:
  - consistency between the location and type of equipment with the area classification details in the site dossier; and
  - equipment certification and any attached conditions that relate to the equipment as it is installed.
- c) Inspecting a hazardous area installation encompassing:
  - typical processes for undertaking the inspection of a hazardous area installation;
  - requirements applicable to a given installation; and
  - reporting of an inspection of a hazardous area installation.

### **2.19.13.1 Explosion-protected equipment overhaul and repair, general requirements**

Evidence shall show an understanding of overhaul and repair procedures of explosion-protected equipment to an extent indicated by the following aspects:

- a) The scope and limitations for overhaul and repair of explosion-protected equipment encompassing:
  - the requirements for registration of a workshop;
  - the requirements of a ‘competent person’ for a registered workshop engaged in the overhaul/repair of explosion-protected equipment; and
  - the scope and limitations of work permitted under workshop registration.
- b) Repair and Overhaul (technical) Standard encompassing:
  - the documentation/information required to enable repairs/overhauls to be undertaken;
  - categories of work, for example, overhaul; no repair; overhaul-repair;
  - modifications that are, and are not, permitted within the equipment certification; and
  - the requirements for overhaul/repair processes relevant to the type of protection and equipment.
- c) Requirements for documentation and identification of overhauled/repared explosion-protected encompassing:
  - overhaul/repair report document; and
  - requirements for distribution of overhaul/repair reports.
- d) Quality management systems as covered by international Standards encompassing:
  - documentation regime of a quality management system;
  - principle of document and data control covering both internally and externally generated documents and data; and
  - principles of process control as applied to the overhaul and repair of explosion-protected equipment.

### **2.19.13.2 Overhaul and repair requirements specific to each explosion-protection technique**

Evidence shall show an understanding of overhaul and repair for specific explosion-protection techniques to an extent indicated by the following aspects:

- a) The level of overhaul/repair required encompassing:
  - Standards and their use for determining the requirement for a specific explosion-protection technique;
  - measurement/tests and equipment required to determine whether an item of equipment meets the certification requirements;
  - requirements for maintaining the accuracy/calibration of measuring/test equipment;
  - measurement/test procedures for determining whether an item of equipment meets the certification requirements;
  - level of overhaul/repair required from comparisons of test results and requirements specified in the original certification; and
  - specifying overhaul/repair work required to restore an item of explosion-protected equipment to conform with the original certification.

b) Measurement/tests procedures to verify that an item of equipment meets the original certification requirements

#### **2.19.14.1 Explosion-protected equipment modification, general requirements**

Evidence shall show an understanding of modifications to explosion-protected equipment to an extent indicated by the following

a) The scope and limitations for design and development of modifications of explosion-protected equipment encompassing:

- the requirements of a ‘competent person’ for a registered workshop engaged in design and development of modifications to explosion-protected equipment; and
- the scope and limitations of modification work permitted.

b) The requirements for documenting and identifying modified explosion-protected equipment encompassing:

- modification report document; and
- requirements for distribution of reports on modifications.

#### **2.19.14.2 Modification requirements specific to each explosion-protection technique**

Evidence shall show an understanding of modifications to specific explosion-protection techniques to an extent indicated by the following aspects

a) Design and development of modifications encompassing:

- verification that equipment to be modified complies with its certification;
- assessing the viability and impact of the requested modification in terms of the explosion-protection properties;
- document of modifications specifications;
- verification tests that can be carried out within a workshop; and
- assessing modified equipment and test results for conformance with applicable Standards.

b) Processes and procedures for obtaining certificate of compliance for modified explosion-protected equipment encompassing:

- Requirements for organizations to be recognised as testing/ certification bodies for explosion-protected equipment.
- Processes used in certifying/approving modified explosion-protected equipment.

#### **2.19.15 Hazardous areas installation planning**

Evidence shall show an understanding of hazardous area electrical installations planning and the selection of appropriate explosion-protected equipment and wiring. The following aspects indicate the extent of understanding required.

a) Interpretation of documents showing the classification of a hazardous area encompassing:

- the methods used for classifying hazardous areas;
- the delineation of zones, temperature classes and gas groups of a given hazardous area from classification documents;
- the delineation of zones, temperature classes and gas groups of a given hazardous area from similar situations previously classified, such as those given in Standards;

and

- situations where classification needs to be undertaken by a person competent in non-specific area classification i.e. a person who has attained Unit UTENES706B
- b) Selecting and checking equipment, wiring and accessories encompassing:
- the impact of environmental conditions, such as corrosion and maintenance requirements, on explosion-protected equipment and accessories;
  - explosion-protected equipment and accessories to suit the requirements of given hazardous areas;
  - wiring systems to suit the requirements of a hazardous area, load and duty requirements and consideration of capacitive/inductive effects and inductance/resistance ratio where applicable;
  - earthing and equipotential bonding requirements for a hazardous area installation;
  - procedures used to check the compliance certification of equipment used in a hazardous area; and
  - electrical protection systems and devices, for example, overloads, earth fault protection) appropriate to an explosion-protection technique.
- c) Documentation of hazardous area installation design encompassing:
- the items that should be included in the documentation for the design of a hazardous area installation;
  - installation layout, specification, work schedule and other documentation required for inclusion in a site dossier; and
  - the essential documentation that needs to be specified/requested from manufacturers when purchasing explosion-protected equipment/ accessories.

#### **2.19.16 Common classified hazardous areas**

Evidence shall show an understanding of common and specific hazardous areas for which classification examples are given in Standards. The following aspects indicate the extent of understanding required.

- a) The example classifications given in Standards
- b) Application of the classifications given in Standards to similar situations for the purpose of planning of electrical installations.

#### **2.19.17 Hazardous areas classification techniques**

Evidence shall show an understanding of processes involved in gathering and analysing technical data to classify non-specific hazardous areas. The following aspects indicate the extent of understanding required.

- a) The process of classifying hazardous areas encompassing:
- methods by which an area can be classified;
  - the characteristics/attributes of an area that should be considered in the classification process, for example, type of process, nature of plant, source and nature of release;
  - the requirements and Standards for classifying a hazardous area; and
  - the responsibilities of the owner/occupiers for classification of a hazardous area.
- b) The risk of an explosive hazard encompassing:
- ignition properties of materials relevant to determining the risk and extent of an explosive hazard;

- sources for obtaining data on ignition properties of materials under the conditions in which they could be present in a given process;
- methods for determining the risk related to hazardous areas and the circumstances appropriate to their use, and

Note:

Example of methods is 'hazard and operability study' (hazop) and 'fault tree analyses' (hazan);

- means for reducing hazard risk.
- c) The extent of an explosive hazard and classifying an area accordingly encompassing:
- the extent of classes and zones for an area given data on the explosive hazard risks for that area;
  - requirements for documenting the classification of a hazardous area; and
  - the extent of the zones, temperature classes and gas groups on site drawings in a hazardous area.

### **2.19.18 Hazardous areas close inspection requirements**

Evidence shall show an understanding of the purpose and process of close inspections to an extent indicated by the following aspects:

- a) Occupational, health and safety procedures encompassing:
- occupational, health and safety procedures to be followed before entering hazardous areas; and
  - occupational, health and safety procedures to be followed while conducting close inspection.
- b) Purpose, scope and limitations of close inspections.
- c) Documentation requirements resulting from a close inspection.

### **2.19.19 Hazardous areas management**

Evidence shall show an understanding of the management responsibilities related to hazardous areas, the strategies used to maintain the safety of hazardous areas and the maintenance requirements. The following aspects indicate the extent of understanding required.

- a) The responsibilities of a person managing activities or a site related to a hazardous area, encompassing:
- OHS procedures that are to be established;
  - responsibilities for ensuring that a hazardous area is safe; and
  - responsibilities and processes for establishing and maintaining a site dossier.
- b) Explosion-protection strategies in relation to a hazardous area, encompassing:
- the process of classifying a hazardous area;
  - various ways in which electrical systems /apparatus can be treated to prevent them from becoming an ignition source; and
  - the cost of the different ways of treating electrical systems/apparatus associated with hazardous areas.
- c) Requirements for the maintenance of electrical systems associated with hazardous areas, encompassing:
- the type and grades of inspection of hazardous areas;
  - maintenance programs for electrical explosion-protected systems/apparatus; and

- documentation requirements associated with maintenance procedures.

### **2.19.20 Explosion-protected electrical systems design**

Evidence shall show an understanding of explosion-protected electrical system design to an extent indicated by the following aspects:

- a) Process for establishing a design brief for an explosion-protected electrical system encompassing:
  - consultation processes for establishing client requirements and preparing a design brief; and
  - system requirements using site and plant specifications, hazardous area classifications and organization requirements.
- b) System design encompassing:
  - major considerations influencing explosion-protected electrical system designs;
  - requirements in Standards and regulations that affect the electrical system design; and
  - typical design process incorporating explosion-protection in an electrical system.
- c) Design documentation required for a hazardous area encompassing:
  - procedures for checking and approval of explosion-protected system design; and
  - requirements for documenting a final design including documents to be included in a site dossier.

### **2.19.21 Explosion-protected equipment conformity assessment**

Evidence shall show an understanding of explosion-protected equipment compliance assessment with to an extent indicated by the following aspects:

- a) The compliance certification and the 'Ex' scheme for recognition of certification encompassing:
  - the purposes of certification of explosion-protected equipment;
  - the parties involved in the assessment/testing and certification of explosion-protected equipment and their responsibilities; and
  - the scheme for recognition of assessment/testing and certification of explosion-protected equipment from other countries.
- b) The preparation required to assess explosion-protected equipment for compliance with Standards encompassing:
  - the special safety measures that should be taken when assessing/testing explosion-protected equipment;
  - documentation required prior to conducting conformity assessment;
  - tests necessary to establish that an item of explosion-protected equipment conforms with relevant Standards; and
  - situations where testing is not applicable or required.
- c) Assessing and testing explosion-protected equipment encompassing:
  - assessment and test requirements; and.
  - procedures for conducting a conformity assessment.
  - Recording and reporting requirements of conformity assessment.

### 2.19.22 Hazardous areas installation testing

Evidence shall show an understanding of testing installations of explosion-protected equipment, wiring and circuits associated with hazardous areas. The following aspects indicate the extent of understanding required.

- a) Preparation for conducting installation testing in a hazardous area encompassing:
  - OHS procedures to be followed for working in a hazardous area; and
  - procedures for determining whether a given hazardous area is safe to conduct electrical testing.
- b) Characteristics and limitations of testing equipment used to test installation in hazardous areas encompassing:
  - testing devices required to test an installation in a hazardous area; and
  - the suitability of testing device for use in a hazardous area.
- c) Testing methods and techniques encompassing:
  - purpose of each test that is required for an installation in a hazardous area

Note:  
Tests include earth continuity, insulation resistance, polarity, interconnection, earth loop impedance and injection tests;

  - preparation required for each test; and
  - interpretation of test results.
- d) Documentation of results of hazardous area installation tests encompassing:
  - test results that should be recorded in a site dossier; and
- e) Procedures and options for dealing with test results that show non-conformance.

### 2.19.23 Explosion-protection visual checks

Evidence shall show an understanding of visible conditions of explosion-protection equipment that indicate the protection is void and changes in the nature of the explosion hazard that may render the explosion-protection unsafe. The following aspects indicate the extent of understanding required.

- a) Occupational, health and safety procedures encompassing:
  - occupational, health and safety procedures to be followed before entering hazardous areas; and
  - occupational, health and safety procedures to be followed while conducting close inspection.
- b) Visible defects in explosion-protected equipment and wiring.
- c) Conditions that may indicate a change in a given explosion hazard.
- d) Reporting defects in explosion-protected equipment and wiring encompassing:
  - the purpose of a site dossier; and
  - various ways for reporting defects in explosion-protected equipment and wiring.
  - procedures to be followed in the event of a change in the explosion hazard.

### 2.19.24 Gas detection—portable devices

Evidence shall show an understanding of the principles of gas detection and the use and care of portable gas detection devices to an extent indicated by the following aspects:

- a) Fundamental principles in the use of gas and vapour instruments.

b) Use of manufacturer's instruction manual.

Note:

Instruction manuals include operating instructions, adjustment procedures, operational limitations, and storage.

c) Calibration and response checking.

**2.19.25 Gas detection—fixed equipment**

Evidence shall show an understanding of requirements and techniques for the installation and maintenance of fixed gas detection equipment to an extent indicated by the following aspects:

- a) Fundamental principles in the use of fixed gas and vapour instruments.
- b) Use of manufacturer's instruction manual, for example, operating instructions, adjustment procedures and operational limitations.
- c) Installation and maintenance Standards for gas detection equipment.
- d) Appropriate locations for fixed gas detectors.
- e) Common problems with fixed gas detectors.
- f) Calibration and response checking.

**2.19.26 Evaluation and selection of gas detection equipment (portable and fixed)**

Evidence shall show an understanding of the factors to consider in the evaluation and selection of portable and fixed gas detection equipment to an extent indicated by the following aspects:

- a) Requirements for gas detection for a given situation encompassing:
  - sources for obtaining data on physical chemistry of the gas to be detected; and
  - sources for obtaining data on the conditions under which the gas may be present.
- b) Processes of assessing the specifications of gas detection equipment against established requirements

**2.19.27 - 28 Reserved**

**2.19.29 Disconnect/reconnect**

Evidence shall show an understanding of the principles to disconnect and reconnect fixed wired equipment connected to supply up to 1000 V a.c or 1500 V d.c. The following aspects indicate to the extent of understanding required:

- a) Procedures for safely determining the availability of supply, encompassing:
  - Selection and setting of appropriate testing device.
  - Safe use of testing device.
  - Concept of 'testing the testing device'
- b) Isolation mechanisms, encompassing:
  - Electrical distribution arrangements within an installation.
  - Circuit isolation and protective devices
  - Appropriate isolation devices for a given load.
- c) Disconnection of an appliance from a single phase and/or multiphase supply of voltages up to 1000 V, encompassing::

- Type and arrangement of circuits supplying various equipment.
  - Note: Equipment can include motors, hot water systems, cooking appliances control devices and neon signs.
  - Procedures to be followed to ensure the safe isolation of the supply.
  - Procedures for disconnection of isolated equipment from fixed wiring.
- d) Suitability of an appliance for reconnection to the supply encompassing:
- Comparison of manufacturer specification between disconnected and replacement equipment.
  - Safety of equipment for connection to the supply.
  - Note: Safety of equipment includes sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate IP rating and arrangements for protection against dangers of mechanical movement are undamaged and in place.
- e) Procedures for ensuring the integrity of the circuit to which the equipment is to be connected, encompassing:
- Insulation resistance of the circuits active conductors.
  - Continuity of the protective earthing conductor to the metallic enclosure of the originating distribution board or main earth electrode.
  - Continuity between the neutral conductor and protective earthing conductor.
- f) Procedures for the reconnection of equipment to the supply, encompassing:
- The safe isolation of the supply before reconnection
  - Wiring preparations for reconnection to equipment.
  - Reconnecting equipment to fixed wiring.
- g) Procedures for verifying equipment is operational, encompassing:
- Energising supply.
  - Safe operation of equipment.

### 2.19.30 Flexible cords and plugs to 250 V

Evidence shall show an understanding of attaching flexible cords and plugs to electrical equipment connected to a single phase 250 V supply, to an extent indicated by the following aspects:

- a) Flexible cords and plugs to suit given applications, encompassing:
- Flexible cord for 250 V single phase load and service duty.
  - Types of three pin plugs for specific load and IP rating requirements.
- b) Safety of an appliance for connection to the supply, encompassing:
- Appropriate test equipment to check that an appliance is safe.
  - Procedures to be followed to ensure the correct use of test equipment.
  - Test results that show appliance is unsafe.
- c) Connection of flexible cords and plugs to appliances, encompassing:
- Preparation of flexible cords for connection to appliances.
  - Connection of flexible cords to appliances.
  - Connection of a plug top to a flexible cord.
- d) Safety of flexible cord and plug assembly, encompassing:
- Plug and cord testing procedures.

- Safe operation of appliance supplied by cord and plug assembly.

### **2.19.31 Flexible cords/cables and plugs to 1000 V**

Evidence shall show an understanding of attaching flexible cords/cables and plugs connected to a supply up to 1000 V a.c. or 1500 V d.c., to an extent indicated by the following aspects:

- a) Flexible cords/cables and plugs to suit given applications, encompassing:
  - Flexible cable for 1000 V multiphase load and service duty.
  - Types of multiphase plugs to 1000 V for a specific load and IP rating requirements.
- b) Safety of an appliance for connection to the supply, encompassing:
  - Appropriate test equipment to check that an appliance is safe.
  - Procedures to be followed to ensure the correct use of test equipment.
  - Test result that show appliance is unsafe.
- c) Connection of flexible cables and plugs to multiphase appliances, encompassing:
  - Preparation of flexible cables for connection to appliances.
  - Connection of flexible cables to appliances.
  - Connection of a plug top to a flexible cable.
- d) Safety of flexible cable and plug assembly, encompassing:
  - Plug and cord testing procedures.
  - Safe operation of appliance supplied by cable and plug assembly

### **2.19.32 Disconnect and reconnect HV electric propulsion components**

Evidence shall show an understanding of the principles for disconnection and reconnection of 3.3 kV electric propulsion components on off-road earth moving trucks. The following aspects indicate the extent of understanding required.

- a) Procedures for safely determining the isolation of supply, encompassing:
  - Selection and setting of HV testing device.
  - Safe use of HV testing device.
  - Concept of ‘testing the testing device’
  - Isolation mechanisms, encompassing:
    - Electrical distribution arrangements within a truck.
    - Drive isolation and protective devices
- b) Disconnection of 3.3 kV electric propulsion components, encompassing:
  - Arrangement of circuits supplying electric propulsion components.
  - Procedures to ensure the safe isolation of the supply.
  - Procedures for disconnection of isolated equipment.
  - Safety of replacement or repaired for reconnection to the truck.

Note: Safety of electric propulsion components includes sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, and arrangements for protection against dangers of mechanical movement are undamaged and in place..

- c) Procedures for the reconnection of electric propulsion components to the supply, encompassing:

- The safe isolation of the supply before reconnection
  - HV wiring preparations for reconnection to equipment.
  - Reconnecting electric propulsion components.
- d) Procedures for verifying electric propulsion components is operational, encompassing:
- Energising supply.
  - Methods for testing safe operation of equipment.

### 2.19.33 High voltage flexible cables and plugs exceeding 1000 V

Evidence shall show an understanding of attaching flexible cables and plugs to electrical equipment connected to a high voltage supply (i.e. exceeding 1000 V a.c. and 1,500 V d.c.) to an extent indicated by the following aspects.

- a) Flexible cords/cables and plugs to suit given H.V applications, encompassing:
- Flexible cables and plugs to suit given H.V applications
  - Types of multiphase plugs H.V for a specific load and IP rating requirements.
- b) Safety of a H.V electrical apparatus (including basic principles of its operation non-mathematical and control) of an appliance for connection to the supply, encompassing:
- Appropriate test equipment to check that apparatus is safe.
  - Procedures to be followed to ensure the correct use of test equipment.
  - Basic principles of operation and control of apparatus supplied by the flexible cables and plug.
  - Test results that show apparatus is unsafe.
- c) Connection of flexible cables and plugs to multiphase appliances, encompassing:
- Preparation of flexible cables for connection to H.V apparatus.
  - Connection of flexible cables to H.V. apparatus.
  - Connection of a HV plug to a flexible cable.
- d) Safety of flexible cable and plug assembly, encompassing:
- Plug and cord testing procedures.
  - Safe operation of apparatus supplied by HV cable and plug assembly.

### 2.19.34 Fault find to 250 V — Motors

Evidence shall show an understanding of locating and rectifying faults in electrical motors intended to be connected to a fixed wired supply up to 250 V, to an extent indicated by the following aspects:

- a) Safe work practices in fault finding and repair work, encompassing:
- Conducting live and dead testing.
  - Procedures for isolation of motor from supply.
- b) Procedures for identifying basic faults, encompassing:
- Types of faults that occur in 250 V motors.
  - Note: Motors include single-phase 'split-phase, capacitor motors and universal type motors.
  - Selection and setting of appropriate testing and measuring devices.

Notes:

1. Testing devices include approved test lamps and voltage indicators.
2. Measuring devices include multimeters, insulation testers, continuity testers, ammeters and

voltmeters.

3. It is recommended that voltage testers, multimeters and voltmeters be certified to IEC standard Category III

- Safe operation of single phase motors.
- Comparison of manufacturer specification between disconnected and replacement motors.

c) Procedures for verifying motor is operational, encompassing:

- Energising the supply.
- Safe operation of motor.

Note: Safety of equipment includes sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate IP rating and arrangements for protection against dangers of mechanical movement are undamaged and in place.

### 2.19.35 Fault find to 250 V — Water heaters

Evidence shall show an understanding of locating and rectifying faults in electrical water heaters intended to operate to a connected fixed wired supply up to 250 V a.c., to an extent indicated by the following aspects:

a) Safe work practices in fault finding and repair work, encompassing:

- Conducting live and dead testing.
- Procedures for isolation of water heater from supply.

b) Procedures for identifying basic faults in single phase water heaters, encompassing:

- Types of faults that occur in water heaters.

Note:

Faults are confined to those related heating elements and control circuits within the water heater.

- Selection and setting of appropriate testing and measuring devices.

Notes:

1. Testing devices include approved test lamps and voltage indicators.
2. Measuring devices include multimeters, insulation testers, continuity testers, ammeters and voltmeters.
3. It is recommended that voltage testers, multimeters and voltmeters be certified to IEC standard Category III

c) Procedures for verifying single phase water heaters are operational, encompassing:

- Comparison of manufacturer specifications between disconnected and replacement water heater.
- Energising the supply
- Safe operation of water heater.

Note:

Safety of equipment includes sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate IP rating.

### 2.19.36 Fault find to 250 V — General appliances

Evidence shall show an understanding of locating and rectifying faults in electrical equipment intended to operate to a connected fixed wired supply up to 250 V, to an extent indicated by the following aspects.

a) Safe work practices in fault finding and repair work of general appliances, encompassing:

- Conducting live and dead testing.

- Procedures for isolation of equipment from supply.
- b) Procedures for identifying basic faults in general appliances, encompassing:
- Types of faults that occur in general appliances.
  - Selection and setting of appropriate testing and measuring devices.
- Notes:
1. Testing devices include approved test lamps and voltage indicators.
  2. Measuring devices include multimeters, insulation testers, continuity testers, ammeters and voltmeters.
  3. It is recommended that voltage testers, multimeters and voltmeters be certified to IEC standard Category III
- In single phase appliances components and circuits.
- c) Procedures for verifying general appliances are safe for operation, encompassing:
- Comparison of manufacturer specifications between disconnected and replacement appliance.
  - Safe operation of appliance.
- Note:
- Safety of equipment includes sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate IP rating and arrangements for protection against dangers of mechanical movement are undamaged and in place

### 2.19.37 Fault find to 1000 V - Motors

Evidence shall show an understanding of locating and rectifying faults in electrical motors and controlgear intended for connection to a fixed wired supply up to 1000 V, to an extent indicated by the following aspects

- a) Safe work practices in fault finding and repair work, encompassing:
- Conducting live and dead testing.
  - Procedures for isolation of motor from supply.
- b) Procedures for identifying basic faults, encompassing:
- Types of faults that occur in three phase motors and starters.
  - Selection and setting of appropriate testing and measuring devices.
- Notes:
1. Testing devices include approved test lamps and voltage indicators.
  2. Measuring devices include multimeters, insulation testers, continuity testers, ammeters and voltmeters.
  3. It is recommended that voltage testers, multimeters and voltmeters be certified to IEC standard Category III
- Safe operation of three phase motors.
  - Comparison of manufacturer specification between disconnected and replacement motors.
- c) Procedures for verifying motor is operational, encompassing:
- Energising the supply.
  - Safe operation of motor.
- Note
- Safety of equipment includes sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate IP rating and arrangements for protection against dangers of mechanical movement are undamaged and in place

### 2.19.38 Fault find to 1000 V — Water heaters

Evidence shall show an understanding of locating and rectifying faults in electrical water heaters intended to operate to a connected fixed wired supply up to 1000 V a.c., to an extent indicated by the following aspects.

a) Safe work practices in fault finding and repair work on three phase water heaters, encompassing:

- Conducting live and dead testing.
- Procedures for isolation of water heater from supply.

b) Procedures for identifying basic faults in three phase water heaters, encompassing:

- Types of faults that occur in three phase water heaters.

Note:

Faults are confined to those related heating elements and control circuits within the water heater

- Selection and setting of appropriate testing and measuring devices.

Notes:

1. Testing devices include approved test lamps and voltage indicators.
2. Measuring devices include multimeters, insulation testers, continuity testers, ammeters and voltmeters.
3. It is recommended that voltage testers, multimeters and voltmeters be certified to IEC standard Category III

c) Procedures for verifying three phase water heaters are safe for operation, encompassing:

- Comparison of manufacturer specifications between disconnected and replacement water heater.
- Safety of water heater for connection to the supply.

Note:

Safety of equipment includes sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate IP rating.

### 2.19.39 Status reports using established procedures

Evidence shall show an understanding of status and service reporting to an extent indicated by the following aspects:

a) The purpose of reports

Note:

Example are parts of a safety or maintenance record, informing the extent of work undertaken or to be done in relation to charging, invoicing or quoting.

b) Content of reports

Note:

Depending on purpose typically inclusions are safety status of equipment and circuits, actions taken with regard to unsafe equipment and circuits, recommendations, item lists, labour and charges.

c) Types of reports

Note:

Example are handwritten, data logged and form completion types.

## 2.20 Sustainable energy and environment

### 2.20.1 Sustainable energy principles

Evidence shall show an understanding of sustainable energy principles to an extent indicated by the following aspects:

- a) Notions of sustainable energy
- b) Sustainable energy work practices

### 2.20.2 Environmental and heritage awareness

Evidence shall show an understanding of environmental and building regulation effecting electrotechnology work to an extent indicated by the following aspects:

- a) Types of heritage listings
- b) Purpose and principles of regulations related maintaining heritage sites
- c) Responsibilities of those working in and around heritage sites
- d) Scope of environmental protection and related regulations
- e) Purpose and principles of regulations related to environmental protection
- f) Responsibilities of those working in and around environmentally protected sites
- g) The protocols for working in and around protected environments and heritage sites.

### 2.20.3 Introduction to renewable energy technologies

Evidence shall show an understanding of renewable energy principles and technologies to the extent indicated by the following aspects:

- a) Major non-technical issues
  - impact of economic, social, environmental and political issues on the use of renewable energy technologies.
  - how each of the non-technical issues impact on the application of a selected renewable energy technology.
- b) Energy services and demand.
  - definition of the terms: energy, power, energy efficiency, end use energy, primary energy, embodied energy.
  - calculation relating to energy, power and time with the appropriate number and time with the appropriate number of significant figures.
  - units and symbols for energy, power, time and temperature using standard SI units and prefixes.
  - conversion of energy and power quantities from one unit to another using conversion tables
  - the two laws that apply to any energy conversion process.
  - efficiency of a simple energy conversion process.
  - energy services required by a domestic dwelling.
  - power and energy consumption of individual appliances and systems using appropriate meters or other methods.
  - calculation of the end use and primary energy required for these energy services.
  - selection of the most appropriate energy source for each of these services.

- justification in terms of environmental, economic, social and political constraints.
  - selection of appropriate energy efficient appliances and technologies.
- c) The solar resource
- definition of the terms: irradiation, latitude, solar constant, direct and diffuse radiation, azimuth and altitude angles, irradiance, solar window, tilt angle, solstice, equinox.
  - units and symbol for irradiation and irradiance and the conversion of one unit to another using conversion tables.
  - measurement of solar irradiance with a solarimeter.
  - solar radiation data tables and contour maps.
  - position of the sun for a given date, time and latitude using a sun path diagram.
  - times when an obstacle will shade a given collector.
  - how radiation varies throughout the year on the surface of a collector which is either fixed, single-axis tracking or double-axis tracking.
  - appropriate tilt angles for fixed and seasonally-adjustable collectors at a given latitude and given application
  - calculation of the effect of single-axis tracking and double-axis tracking on collected radiation using radiation data tables.
- d) Solar thermal systems
- definition of the terms: conduction, convection, radiation, collector heat loss coefficient, conductivity, specific heat, solar fraction.
  - components for a solar thermal system including collector, storage, reticulation and control.
  - solar collector types suitable for low, medium and high temperature applications.
  - different types of domestic solar hot water (SWH) systems.
  - how the components of thermosiphon and pumped storage systems operate.
  - heat loss mechanisms in collectors.
  - stratification in storage tanks.
  - backup energy systems.
  - control and protection strategies.
  - solar fraction of a domestic SHW system with the use of table or nomograms.
- e) Energy efficient building design
- definition of the terms: thermal comfort, passive system, active system, aspect of the site, orientation of the building, thermal mass.
  - the climate factors which affect building design.
  - relationship between thermal comfort and climate.
  - relationship between the seasonal variation of the sun's path and the heat gain of the building elements (roof, walls, windows, floor).
  - effect of the thermal conductivity of building materials on heat flows to and from the building
  - use of thermal mass in reducing temperature variations within the building.
  - use of ventilation.
  - thermal performance of a dwelling using both indoor and outdoor hourly temperature measurements over the period of at least one day.
  - effect of insulation, glazing, orientation, shading devices, thermal mass and

ventilation on the thermal performance of a building.

- an active solar system which could be used in a dwelling to complement passive design features in extreme climates.
- aspects of an existing dwelling that contribute to or detract from thermal performance.

f) Photovoltaic arrays

- definition of the terms: photovoltaic (PV) cell, module, series, parallel, array, maximum power point (MPP), nominal operating cell temperature (NOCT), short circuit current ( $I_{SC}$ ), open Circuit voltage ( $V_{OC}$ ), I-V curve, current at maximum power point ( $I_{MP}$ ), voltage at maximum power point ( $V_{MP}$ ).
- calculations relating to voltage, current and power with the appropriate number of significant figures and using standard SI units and prefixes.
- types of commercially available PV modules, their efficiency and typical applications.
- I-V curve for a typical PV module and label the approximate position of MPP and values of  $I_{SC}$ ,  $V_{OC}$ ,  $I_{MP}$  and  $V_{MP}$ .
- effect of irradiance and temperature on  $I_{SC}$ ,  $V_{OC}$ ,  $I_{MP}$  and  $V_{MP}$ .
- function of blocking and bypass diodes.
- current and voltage of a single module to produce the I-V characteristic curve.
- major specification criteria for a PV module.
- size and configuration of a PV array for a given load and system voltage using tables or nomograms.

g) Wind energy resources

- definition of the terms: kinetic energy, specific wind power, vertical wind speed profile, surface roughness, temperature inversion layer, cut in ( $v_C$ ), rated ( $v_R$ ) and furling ( $v_F$ ) wind speeds, rated power ( $P_R$ ), power co-efficient ( $c_P$ ), output co-efficient ( $c_O$ ), tip speed ratio.
- units and symbols for wind speed, specific wind power and air density.
- large scale wind patterns over the Australian continent, their causes and the effect of local terrain on wind speed, direction and turbulence.
- specific wind power for given wind speeds.
- wind speed at different heights above ground level.
- the mean wind speed based on wind speed frequency distribution data in the form of a histogram.
- suitable minimum tower height for a Wind.
- energy conversion System (WECS) sited downwind from an obstacle.
- isovent maps.
- types of wind-measuring instruments and the minimum requirements for assessing wind energy at a given site.
- measurement of wind speed and direction
- characteristics of horizontal axis and vertical axis, upwind and downwind, lift and drag propelled wind turbines.
- power vs wind speed curve for a typical WECS showing  $v_C$ ,  $v_R$ ,  $v_F$ , and  $P_R$ .
- major specification criteria for a WECS.
- sizing a WECS for a given load, efficiency and annual mean wind speed using

tables or a nomogram.

h) Micro-hydro system basis

- definition of the terms: flow rate, gross or static head, potential energy, net or dynamic head, hydraulic efficiency, MHS efficiency, equivalent pipe length, reaction turbine, impulse turbine
- units and symbols for: flow rate, head, gravitational constant
- methods each assessing flow rate and head.
- measurement of stream flow rate and head.
- assessment from contour maps.
- different MHS in terms of their physical and operating characteristics.
- major specification criteria for an MHS for electricity generation.
- suitable type and size of MHS for a given load, efficiency, available flow rate and net head using tables or a nomogram.

i) Energy storage

- methods of energy storage.
- energy density of the energy storage methods above by mass and volume.
- define the following terms in relation to batteries: nominal voltage, cell, primary and secondary cells, battery, charge and discharge rate, amp hour capacity, watt hour capacity, state of charge (SOC), depth of discharge (DOD), specific gravity (SG), watt hour and amp hour efficiency, cycle life.
- major features of common types of batteries suitable for stand-alone power systems.
- state of charge of a lead-acid battery through measurement of specific gravity or battery voltage using safe working practices.

j) Stand alone power system basis

- d.c. sub-system efficiency.
- block diagram of a typical SPS
- function of each SPS system component
- typical efficiencies of each component.
- major characteristics of different types of commercially available regulators, inverters and battery chargers.

k) Biomass

- definition of the terms: biogas, producer gas, biofuels, feedstock, gross and net calorific values.
- biofuels and their specific energy contents
- method of production of one of these five biofuels including: source of raw material/feedstock, conversion process, yield
- applications for each of the biofuels.
- assessment of the biomass resource required to meet a particular energy service eg cooking, hot water, space heat, transport, process heat, electricity.
- social, political and economic impact of large scale use of selected biomass resources.

#### 2.20.4 Greenhouse reduction strategies

Evidence shall show an understanding of greenhouse reduction strategies to the extent

indicated by the following aspects:

- a) Greenhouse gas emissions profile
  - *goals* and *principles* of the National Greenhouse Strategy
  - what a greenhouse gas inventory is, why it is required, and the sectors to which it applies
  - uses to which the National Greenhouse Gas Inventory can be applied.
- b) Understanding and communicating climate change and its impacts
  - the possible impact of climate change in Australia.
  - techniques for improving the understanding of climate change
  - techniques for communicating to and educating the general public on greenhouse gas induced climate change.
- c) Partnerships for greenhouse action
  - actions achievable by each level of government to implement the NGS.
  - methods by which the community activity can be engaged in the reduction of greenhouse gas emissions.
  - initiatives that can be undertaken by the private sector to reduce greenhouse gas emissions.
  - advantages of international partnerships.
  - emissions trading system.
- d) Efficient and sustainable energy use and supply
  - techniques for reducing the greenhouse intensity of energy supply.
  - types of renewable energy sources suitable for use in Australia.
  - methods and technique for improving end-use efficiency.
- e) Efficient transport and sustainable urban planning
  - how integrating land use and transport planning can assist the greenhouse problem.
  - how each of the following can be used to mitigate greenhouse gas; travel demand and traffic management strategies; encouraging greater use of public transport, walking and cycling; freight and logistics systems; improving vehicle fuel efficiency and fuel technologies;
- f) Greenhouse sinks and sustainable land management
  - how enhancing greenhouse sinks and encouraging sustainable forestry and vegetation management can complement the AGS.
  - how greenhouse gas emissions are obtained from agricultural production and describe techniques to mitigate the emissions.
- g) Models of greenhouse best practice in industrial processes and waste management
  - types and methods of reducing greenhouse gas emissions from industry.
  - methods of reducing methane emissions from waste treatment and disposal.
- h) Adaptation to climate change
  - salient points in each of the key sectors that require analysis and the strategies required in the need for adaptation to climate change
- i) Kyoto Protocol and greenhouse gas sinks
  - Kyoto Protocol
  - Greenhouse gas sinks and greenhouse mitigation

## 2.20.5 Remote area essential services facilities

Evidence shall show an understanding of remote area essential service facilities to an extent indicated by the following aspects:

- a) Window repair and maintenance encompassing:
  - Emergency repairs
  - Louvre type
  - Fixed pane type
  - Shutters
  - Safety awareness
- b) Repair and maintenance to fences and gates encompassing:
  - Emergency repairs
  - Locks and catches
  - Security fencing
  - Fence maintenance
  - Gates
  - Safety awareness
- c) Maintenance painting encompassing:
  - Preparation of surfaces
  - Block work
  - Concrete
  - Timber
  - Steel
  - Paint selection
  - Brush and roller selection
  - Paint application
  - Clean up process
  - Paint and accessories storage
  - Safety awareness
- d) Essential services facilities lighting encompassing:
  - Incandescent light globes
  - Fluorescent tubes
  - Fluorescent light starters
  - Diffusion devices
  - Safety awareness
- e) Essential services facilities safety and security and emergency checks encompassing:
  - Broken windows
  - Faulty lighting
  - Damaged gates
  - Logging the inspections
  - Notification of the situation
  - Safety awareness
- f) Telephone encompassing:
  - Answer calls promptly and clearly.
  - Using designated business protocol procedures.

- Making and receiving telephone calls in a workplace related
- context.
- Obtain accurate telephone numbers from an appropriate source.
- Establish contact using designated business protocol
- procedures.
- Convey purpose all call clearly and concisely.

g) Mathematics encompassing:

- Using basic mathematical skills to perform calculations with
- whole numbers.
- Fractions
- Decimals
- Percentages
- Ratios
- Proportions

h) Electrical encompassing:

- Identification and basic function of electrical components used
- for generating and distributing.
- Electricity safety procedures when working with electricity.
- Identification of faulty electrical components.
- Reporting of faulty electrical components.

i) Fire fighting equipment encompassing:

- Fire extinguishers and signage
- Types of fire extinguishers
- Contents and colour
- Correct identification
- Use of fire extinguishers
- Use of water hose and reel
- Safety awareness

### **2.20.6 Remote area essential services power plant**

Evidence shall show an understanding of remote area essential services power plant to an extend indicated by the following aspects:

a) Minor servicing of a power station's generating plant encompassing:

- Engine oil and filters
- Fuel filters
- Coolant filters
- Water trap devices
- Air cleaners

b) Minor maintenance of a power station's generating plant encompassing:

- Fan and accessory drive belts
- Repair of minor leaks: coolant, oil and fuel

c) Servicing of a power station's generating plants battery systems encompassing:

- Starting battery set
  - Switchboard (nicad) batteries
- d) Information displayed by the instruments/meters in a power station encompassing:
- Generating equipment (diesel engine)
  - Engine lubrication
  - System oil pressure
  - Engine cooling system coolant
  - Temperature (in and out)
  - Fuel pressure
  - Amperes
  - Voltage
  - Kilowatt
  - Kilowatt hours
  - Frequency hertz (Hz)
  - Engine running hours
  - Station services: Fuel tank dip; Lubricating oil tank level;
  - Fuel flow meter
- e) Use of the information gathered from instruments/meters encompassing:
- Ordering of: Fuel; Lubricating oil; Coolant
  - Schedule regular servicing and maintenance for: Engine oil and filter changes; Fuel filters; Drive belt (condition/adjustment); Valve adjustments (if applicable); Major and minor mechanical servicing by outside agents; Air cleaner (both dry paper and oil bath types)
- f) Power station log sheets and readings encompassing:
- Completed log sheets
  - Forwarding information to appropriate person/location at regular intervals (weekly)
- g) General cleanliness of the power stations plant and buildings encompassing:
- Generation plant
  - Oil leaks
  - Water leaks
  - Fuel leaks
  - Safety awareness
  - Plant buildings
  - Internal floor area
  - Used consumables
  - Spare parts storage
  - Spider webs & other pests
  - Rubbish containers
  - Ventilation
  - Power station compound
  - Fence and gate (if applicable)
  - Weeds
  - Grass (if applicable)

- Rubbish containers
- Fuel and oil supply, (drums)
- Water reticulation (if applicable)
- Tools and equipment
- Location/storage
- Cleanliness
- Maintenance
- Drain/drip tins
- Safety signage
- Location
- Condition
- Suitability

### **2.20.7 Remote area essential services waste water facilities**

Evidence shall show an understanding of remote area essential services waste water facilities to an extent indicated by the following aspects:

- a) Location of faults encompassing:
- b) Identification and isolation of faults encompassing:
  - Identifying fault/s
  - Types of fault/s
  - Make safe procedures
  - Isolating the fault/s
  - Gas and fume detection
  - Notification
  - Personal hygiene
  - Safety awareness
- c) Fumes and gases encompassing:
  - Breathing apparatus
- d) Public awareness encompassing:
- e) Emergency repairs and blockages encompassing:
  - Identifying the emergency
  - Locating the emergency
  - Prioritising the repairs
  - Notifying the appropriate person/s
  - Public safety precautions
  - Breathing apparatus
  - Safety signage
  - Repairing the system
  - Reactivating the system
  - Personal hygiene
  - Safety awareness
- f) Treatment and storage of pumping equipment maintenance encompassing:

- Identifying the systems pumping equipment
  - Identifying the systems control mechanism/s
  - Isolating the system
  - Make safe procedures
  - Operating the pumps
  - Maintenance of the system
  - Recording work details
  - Notification
  - Personal hygiene
  - Safety awareness
- g) Manhole and grounds maintenance encompassing:
- Safety barricades and fences
  - Safety signage
  - Manhole cover condition
  - Clearing debris
  - Grounds maintenance
  - Personal hygiene
  - Safety awareness
- h) Treatment pond maintenance encompassing:
- Weed and grass control
  - Pest control
  - Scraping of the pond/s
  - Closing pen stocks
  - Cleaning trash baskets
  - Reactivating the system
  - Removing the waste
  - Burying the waste
  - Housekeeping
  - Personal hygiene
  - Safety awareness
- i) Instrumentation, reading and recording of information encompassing:
- Locating the instrumentation
  - Identify the instruments
  - Read the displayed information
  - Log the information
  - Notification
  - Personal hygiene
  - Safety awareness

### **2.20.7 Remote area essential services waste water facilities**

Evidence shall show an understanding of remote area essential services waste water

facilities to an extent indicated by the following aspects:

a) Location of faults encompassing:

b) Identification and isolation of faults encompassing:

- Identifying fault/s
- Types of fault/s
- Make safe procedures
- Isolating the fault/s
- Gas and fume detection
- Notification
- Personal hygiene
- Safety awareness

c) Fumes and gases encompassing:

- Breathing apparatus

d) Public awareness encompassing:

e) Emergency repairs and blockages encompassing:

- Identifying the emergency
- Locating the emergency
- Prioritising the repairs
- Notifying the appropriate person/s
- Public safety precautions
- Breathing apparatus
- Safety signage
- Repairing the system
- Reactivating the system
- Personal hygiene
- Safety awareness

f) Treatment and storage of pumping equipment maintenance encompassing:

- Identifying the systems pumping equipment
- Identifying the systems control mechanism/s
- Isolating the system
- Make safe procedures
- Operating the pumps
- Maintenance of the system
- Recording work details
- Notification
- Personal hygiene
- Safety awareness

g) Manhole and grounds maintenance encompassing:

- Safety barricades and fences
- Safety signage
- Manhole cover condition
- Clearing debris
- Grounds maintenance

- Personal hygiene
  - Safety awareness
- h) Treatment pond maintenance encompassing:
- Weed and grass control
  - Pest control
  - Scraping of the pond/s
  - Closing pen stocks
  - Cleaning trash baskets
  - Reactivating the system
  - Removing the waste
  - Burying the waste
  - Housekeeping
  - Personal hygiene
  - Safety awareness
- i) Instrumentation, reading and recording of information encompassing:
- Locating the instrumentation
  - Identify the instruments
  - Read the displayed information
  - Log the information
  - Notification
  - Personal hygiene
  - Safety awareness

### **2.20.8 Remote area essential services water facilities**

Evidence shall show an understanding of remote area essential services water facilities to an extent indicated by the following aspects:

- a) Valve operation encompassing:
- Types of valves
  - Location
  - Identification
  - Isolation operations
  - Make safe procedures
  - Maintenance
  - Safety awareness
- b) Fault conditions encompassing:
- Location
  - Identification
  - Notification
  - Make safe protection
  - Rectification
  - Safety awareness
- c) Corrosion control encompassing:

- Identification
  - Descaling
  - Repair as necessary
  - Prevention procedures
  - Reporting procedures
  - Safety awareness
- d) Leaking pipes encompassing:
- Location
  - Identification
  - Repairing of the leak/s
  - Area protection
  - Isolation
  - Excavation (if necessary)
  - Emergency repairs
  - Safety awareness
- e) Water meters encompassing:
- Identification and location
  - Reading and recording
  - Fault identification
  - Isolation of the system
  - Changing a faulty meter
  - Notification
  - Safety awareness
- f) Valve systems isolation encompassing:
- Location
  - Identification
  - Isolation of valve systems
  - Operation of valve systems
  - Make safe procedures
  - Maintenance (filtration)
  - Recording of work performed
  - Safety awareness
- g) Treatment plant instrumentation encompassing:
- Location
  - Identification
  - Reading and recording
  - Recognition of fault/s
  - Fault condition/s
  - Notification of fault condition/s
  - Safety awareness
- h) Facilities maintenance encompassing:
- Corrosion control
  - Painting

- Descaling
  - Bolt replacement
  - Water leaks
  - Site clearing (debris and weeds)
  - Notification of work (completed or required)
  - Emergency repairs
  - Safety awareness
- i) Chemicals encompassing:
- Identification
  - Storage procedures
  - Ventilation
  - Signage
  - Haz-chem awareness
  - Fire control
  - Emergency procedures
  - Application
  - Personal protective equipment
  - Safety awareness
- j) Gas cylinders encompassing:
- Location
  - Identification
  - Hoses and fittings
  - Storage and handling
  - Signage
  - Personal protective equipment
  - Safety awareness
- k) Stock control encompassing:
- Recording
  - Receiving
  - Gas cylinders
  - Filters and seals
  - Chemicals
- l) Water sampling for analysis encompassing:
- Cleaning and scouring
  - Water samples
  - Chemical addition
  - Recording and reporting of information
  - Report findings
  - Safety awareness
- m) Operation of water pumps encompassing:
- Pump selection
  - Pump types
  - Water pump operation

- Diesel engine service
  - Bore operations
  - Safety awareness
- n) Reading and recording of the systems instruments encompassing:
- Reading and recording information
  - Mechanical instruments
  - Electrical instruments
  - Bore instruments
  - Flow meters
  - Notification of faults
  - Safety awareness
- o) Operation and isolation of components encompassing:
- Isolation valves
  - Identification and isolation
  - Systems isolation
  - Filtration equipment
  - Inspection of the system
  - Recognition of faults
  - Notification of repairs and maintenance
  - Safety awareness
- p) Maintenance encompassing:
- Painting preparation
  - Corrosion control
  - Paint selection
  - Application methods
  - Cleaning and storage
  - Solar panels
  - Structural
  - Storage tank
  - Reporting problems
  - Housekeeping
  - Safety awareness
- q) Water sampling ( analysis ) encompassing:
- Cleaning and scouring
  - Weeds and debris
  - Water samples
  - Recording and reporting information
  - Reporting of findings
  - Safety awareness

#### **2.20.9.1 Stand-alone renewable energy system components**

Evidence shall show an understanding of stand alone renewable energy system components

to an extent indicated by the following aspects:

a) ELV wiring and circuit protection for renewable power systems.

- extra low voltage (ELV) and low voltage (LV) circuits in a stand-alone or grid connected renewable power system and the regulatory restrictions regarding work at each level.
- earthing requirements for renewable power systems over a range of applications and environments
- required sizes for ELV cabling in a renewable power system, considering allowable voltage drops and cable current carrying capacity, in accordance with AS/NZS 3000 and AS 4509.
- Selection of suitable d.c. circuit protection and isolation for all relevant points in a stand-alone renewable power system, in accordance with AS/NZS 3000 and AS 4509

b) Electrical diagrams for a renewable power system

- functional block diagrams for typical stand-alone renewable power system configurations.
- circuit schematic of typical renewable power systems supplying d.c. and/or a.c. loads, including all major components, protection devices, earthing, isolation, switching and metering
- unit wiring diagram for a typical renewable stand-alone power system d.c. control board
- architectural and site diagrams to show the locations of equipment, fittings and cabling

c) Batteries

- major features of each of the major types of commercially available batteries for stand-alone power system applications including basic chemistry, physical structure, advantages and disadvantages
- factors affecting the life of a battery
- processes of sulphation and stratification in lead acid batteries, their causes, effects and methods of prevention or reduction.
- effect of depth of discharge and of temperature on the capacity and life of lead-acid batteries.
- major specifications for a lead-acid battery in a stand-alone power system application.
- main features of charging regimes suitable for the major types of stand-alone power system batteries, using real examples.
- life of a standalone power system battery in years, based on manufacturer's cycle life data and given capacity, configuration and operating conditions
- precautions required when handling, installing or maintaining lead-acid batteries.
- procedures required for safe disposal of the major commercially available types of batteries in accordance with AS 4509.

d) Balance of system components and common loads.

- features of commercially available inverters suitable for use in stand-alone power systems.
- major operating parameters of an inverter, including d.c. voltage operating window; efficiency, output voltage waveform and output voltage regulation over a range of loads up to 5 minute ratings.
- problems that may be caused by non-sine supply voltage waveforms on typical

loads, and the solutions used to overcome these

- significance of low power factor loads for inverter systems and the principle of power factor correction.
- operation of the major types of regulators for use in stand-alone renewable power systems, using commercially available equipment as examples.
- current vs voltage characteristics, efficiency and charging voltage waveform for a transformer/rectifier type and a switchmode type battery charger suitable for use in stand-alone renewable power systems.
- operation of and applications for MPPTs for photovoltaic arrays.
- basic operation, advantages and disadvantages of mechanical tracking devices for PV arrays.
- control parameters or data using digital displays on inverters, regulators or controllers

e) Basic lighting design.

- properties and features of the major lamp types including their suitability for use in stand-alone PV power systems.
- effect on room lighting levels, of luminaire design and positioning, décor, room construction and windows.
- Selection and sizing of suitable lamps and fittings and their placement in a household taking into account usage, lighting levels required by relevant standards, and energy efficiency considerations.

f) Generating sets

- major components in the construction of a generating set
- main components of gas, petrol or diesel internal combustion engines
- basic principle of operation of internal combustion engines, including different fuel types and ignition methods.
- operating characteristics, advantages and disadvantages of gensets using different fuel types, aspiration methods, operating speed and number of cylinders.
- major methods of mechanical coupling and power transmission between an engine and alternator
- function and ratings of mechanical and electronic speed governing systems.
- basic structure and operation of an alternator.
- advantages and disadvantages of different types of excitation system and voltage regulation used for genset alternators.
- components and basic operation of a brushless excitation system in an alternator, and the principle of self-excitation

g) Generator set sizing calculations

- major electrical and mechanical ratings which control the performance of a genset
- calculations relating to real and apparent power, power factor, mechanical power, voltage regulation and speed droop for single phase gensets
- derating factor for a genset given manufacturer's derating data and a given set of operating conditions.
- Selection of a suitable genset given maximum demand and surge loadings and derating factor.
- Calculation of the fuel consumption of a genset given manufacturer's data and operating conditions.

### 2.20.9.2 Stand-alone renewable energy system design consideration

Evidence shall show an understanding of stand alone renewable energy system components to an extent indicated by the following aspects:

- a) Load analysis and projected use
- b) Availability of sustainable /renewable energy sources
- c) Component selection factors encompassing:
  - Intended environment
  - Distance between system and users
  - Maintenance and serviceability requirements
  - Rating and diversity
- d) Installation requirement

### 2.20.10 Hybrid energy systems

- a) Energy demand
  - end-use services and energy demand for each service.
  - most appropriate energy sources for each energy service for a given application and location, taking into consideration economic, environmental and client requirements.
  - greenhouse gas savings from a hybrid energy system compared to an existing non-hybrid system, resulting from energy source switching and reduction in fuel usage.
  - daily load profiles illustrating average demand and maximum demand, based on time of use data for all electrical loads
  - daily load profiles based on given load data, with consideration of likely variations in usage patterns.
  - load management strategies and or energy source switching options to reduce the maximum and surge demand, based on load profile analysis
  - load profile using a.c. power logging equipment
  - daily load profiles illustrating average demand and maximum demand, based on time of use data for all electrical loads
- b) Hybrid energy system operation
  - Definition of the terms complementarity (in relation to renewable energy resources) availability
  - advantages and disadvantages of hybrid energy systems.
  - major features of typical system configurations including pure renewables; renewables and genset; series; switched; parallel (including those with nominal daily genset running)
  - operation of a hybrid system over the short term (e.g. daily) and long term (e.g. seasonal, annual).
  - response of a genset to a step change in load, and to an overload condition.
  - calculations relating to real and apparent power, power factor, mechanical power, voltage regulation and speed droop for single and three phase gensets.
  - Calculation of the average efficiency of a genset supplying a given daily load profile, given genset efficiency vs load data.
- c) System design

- system design criteria in consultation with a client.
- renewable energy resources available at a site through the use of on-site measurements and pre-existing weather data as appropriate.
- Selection of a suitable hybrid power system configuration
- Selection and sizing of suitable renewable energy generators for a hybrid energy system taking into consideration available renewable energy resources and daily and seasonal load profiles consistent with AS 4509.2.
- Analysis of load data to determine preferred time of day for genset running, and required energy storage in a parallel hybrid system.
- Selection and sizing of a suitable genset for any system configuration, including a parallel system, according to AS 4509.2
- Selection and sizing of suitable balance-of-system components for a hybrid energy system including energy storage, controls and inverters consistent with AS 4509.2.
- Selection and sizing of a battery bank to meet both energy and maximum power demands in a parallel hybrid system, using an appropriate battery discharge rate and considering load data and genset running times
- Selection of an inverter for a parallel hybrid system, considering load data, genset running times and battery charging requirement.
- Selection and sizing of suitable internal combustion generators (genset) for a hybrid energy system taking into consideration genset characteristics and de-rating requirements
- performance of the system given load data, resource data, equipment specifications, configuration and control strategy.
- Calculation of the load fraction contributed from each renewable energy generator and from the genset.
- Calculation of the genset run time and fuel usage
- Optimisation of the system design based on a mix of design criteria such as cost, availability and reliability, maintenance, environmental factors, convenience etc.
- system manual according to AS 4509.3 and AS 4509.2, given system components and design data

d) Life cycle costing

- present worth of a future payment
- major costs in the life cycle of a hybrid energy system to be considered in life cycle costing.
- Selection of an appropriate discount rate, inflation rates, and life cycle for a hybrid system life cycle cost analysis.
- life cycle cost analysis including the cost of finance and tax savings for a hybrid system using computer software
- most cost effective of a number of hybrid energy system options on the basis of life cycle costing analysis according to AS 4536, AS 3595 or similar standards.
- Comparison of the capital cost, simple pay back time and life cycle cost of a hybrid energy system with another energy supply option, according to AS 4536, AS 3595 or similar standards.
- sensitivity analysis of life cycle costing to variations in discount rate or other major parameters

e) Installation, commissioning and maintenance

- Specification of the installation and maintenance requirements for a complete hybrid energy system taking into consideration safety and relevant Australian

#### Standards

- installation requirements for fuel storage for a given genset in accordance with AS 1940, AS 4509 and local regulations
- considerations involved in providing adequate genset vibration isolation
- considerations involved in providing a genset exhaust system suitable for a given genset and installation site.
- major considerations and methods used in providing suitable noise attenuation for a genset installation.
- Specification of the physical accommodation requirements for a given genset to provide adequate air flow and noise attenuation, with due regard for safety, maintenance access, and in accordance with AS 3010 and AS 4509.
- methods used to allow extended service intervals for gensets
- main features of engine protection systems commonly used on small gensets, and the genset sizes to which these are applicable.
- installation and commissioning work on a small genset and controller observing relevant OHS guidelines.
- symptoms of common genset faults
- basic fault location and rectification on a genset with the aid of troubleshooting guides or flowcharts.
- symptoms, causes and possible solutions for the phenomenon of “hunting”.
- maintenance schedule for a hybrid power system.

#### f) Data communications

- typical applications of data communications in renewable energy systems.
- different types of cables and connectors used in data communications between electronic devices and computers.
- commonly used protocols used for serial data communications
- different communications ports on palmtop, laptop or desktop computers
- Correction of an electronic device (e.g. inverter or charge controller) to a computer directly, and via modems and telephony network, using appropriate cabling, connectors and computer ports
- dial-up connection from a computer to a remote electronic device, such as an interactive inverter.
- standard terminal program or proprietary communications software to send to and receive data from an electronic device.
- Programming and retrieving data from an interactive inverter via a computer and data communications link.
- logged data downloaded from an interactive inverter.

#### g) Data-logging

- general features and operation of on-site and remote data logging systems for monitoring and control of a hybrid energy system.
- logger programming, data downloading, display and interpretation of the results

#### h) Interactive inverters

- main features of different devices commonly used as controllers in hybrid energy systems
- function and operation of an interactive inverter.
- system control philosophies used in different interactive inverters

- program parameters for an interactive inverter, as required for the correct operation of a parallel hybrid system given system component details, load data and preferred genset running times.
- appropriate charging regime for the system battery, based on manufacturer's data and system operating conditions.
- Programming an interactive inverter through its front panel interface.
- function, operation and major features of a genset controller and how it interfaces with a system controller such as an interactive inverter.

### 2.20.11 Sustainability and greenhouse reduction strategies

Evidence shall show an understanding of sustainability to the extent indicated by the following aspects:

- a) Principles of sustainability
  - ways in which ecosystems moderate climate.
  - ways in which ecosystems purify and store water.
  - ways in which ecosystems recycle waste.
- b) Problems in a sustainable world
  - changes to Australian forest cover since white settlement, and the resulting loss of ecosystem and human benefits.
  - changes to Australia's soils since white settlement, and the resulting loss of ecosystem and human benefits.
  - changes to Australia's waterways since white settlement, and the resulting loss of ecosystem and human benefits.
  - place of environmental accounting in quantifying Australia's environmental losses.
  - limits to Australia's population carrying capacity.
- c) Sustainability principles
  - principles within sustainability including: environmental accounting and economics; full cost pricing; triple bottom line ethic; ecologically sustainable development; greenhouse gas abatement; energy efficiency; resource and water use efficiency; life cycle costing; renewable energy substitution, cleaner production; waste minimisation, reuse and recycling; ecological footprint.
- d) Addressing the problem of global warming
  - greenhouse gases and their sources and quantities that contribute to global warming.
  - global warming impacts for Australia for 2030 and 2070 predicted by CSIRO modelling.
  - requirements to achieve stable atmospheric concentrations of greenhouse gases.
  - ecologically and economically sustainable methods for achieving these stable concentrations.
- e) Greenhouse gas emissions profile
  - *goals* and *principles* of the National Greenhouse Strategy
  - what a greenhouse gas inventory is, why it is required, and the sectors to which it applies
  - uses to which the National Greenhouse Gas Inventory can be applied.
- f) Understanding and communicating climate change and its impacts
  - the possible impact of climate change in Australia.

- techniques for improving the understanding of climate change
  - techniques for communicating to and educating the general public on greenhouse gas induced climate change.
- g) Partnerships for greenhouse action
- actions achievable by each level of government to implement the NGS.
  - methods by which the community activity can be engaged in the reduction of greenhouse gas emissions.
  - initiatives that can be undertaken by the private sector to reduce greenhouse gas emissions.
  - advantages of international partnerships.
  - emissions trading system.
- h) Efficient and sustainable energy use and supply
- techniques for reducing the greenhouse intensity of energy supply.
  - types of renewable energy sources suitable for use in Australia.
  - methods and technique for improving end-use efficiency.
- i) Efficient transport and sustainable urban planning
- how integrating land use and transport planning can assist the greenhouse problem.
  - how each of the following can be used to mitigate greenhouse gas; travel demand and traffic management strategies; encouraging greater use of public transport, walking and cycling; freight and logistics systems; improving vehicle fuel efficiency and fuel technologies;
- j) Greenhouse sinks and sustainable land management
- how enhancing greenhouse sinks and encouraging sustainable forestry and vegetation management can complement the AGS.
  - how greenhouse gas emissions are obtained from agricultural production and describe techniques to mitigate the emissions.
- k) Models of greenhouse best practice in industrial processes and waste management
- types and methods of reducing greenhouse gas emissions from industry.
  - methods of reducing methane emissions from waste treatment and disposal.
- l) Adaptation to climate change
- salient points in each of the key sectors that require analysis and the strategies required in the need for adaptation to climate change

### 2.20.12 Energy efficient building design

Evidence shall show an understanding of energy efficient building design to the extent indicated by the following aspects:

- a) Climate and thermal comfort.
- characteristics of the different Australian climatic types.
  - use of climatic data in published and electronic forms to extract the quantities relevant to energy efficient design.
  - relationship between climate and comfort using bioclimatic or psychrometric charts.
  - calculation of heating or cooling degree days or degree hours for various locations.
  - calculation of thermal neutrality for a given location.
- b) Solar geometry and radiation

- definition of the terms: declination, hour angle, zenith angle, azimuth and altitude angles, the equation of time.
  - conversion of solar time to local time and vice versa.
  - position of the sun and the length of shadows with the aid of algorithms, tables, sun charts or computer software.
  - daily irradiation incident on a wall, window or roof of a given tilt and orientation.
  - relative summer and winter irradiation of windows facing the cardinal orientations.
- c) Heat transfer
- thermal processes of conduction, convection and radiation apply to the transfer of heat in buildings.
  - calculation of the summer and winter U-values of building elements using tables and software.
  - calculation of the infiltration heat transfer in a building.
- d) Glazing Systems
- different types of glazing systems and their characteristics.
  - different types of shading devices and the window orientations for which they are most appropriate.
  - solar heat gain for different glazing types and angles of incidence
  - calculation of the average daily irradiation of a window partly shaded by eaves, using computer software.
  - calculation of the average daily heat gain through a window partly shaded by eaves.
- e) Insulation
- different types of insulation and where they are used.
  - how different types of insulation are installed in roofs, walls and floors.
  - determination of the minimum R-values of roof insulation for different locations using Australian Standard AS2627 or similar standards.
- f) Thermal mass
- advantages and disadvantages of using substantial thermal mass in different climate types and for different heating and cooling regimes.
  - where thermal mass can be located in a building.
  - explain what is meant by the following terms: time lag, decrement factor, admittance, response factor.
- g) Comfort control strategies
- interpretation of the usefulness of a design strategy with the aid of a psychrometric chart showing control potential zones for a particular location.
  - selection of the most useful comfort control strategies for Australian climatic regions.
- h) Energy efficiency in buildings
- determination of the direction of the following: both true and magnetic, north winter and summer sunrise, winter and summer sunset.
  - solar access in summer and winter to various possible house locations on a site and room locations within the house.
  - how vegetation can be used to both funnel and deflect wind.
  - using cross ventilation as a cooling strategy.
- i) Thermal performance of a building
- heating requirements of a building using the heating degree day or hour method.

- dynamic performance predicted by a computer simulation program such as NatHERS or BERS.
- j) Integration of active solar systems
- active solar system types available which can provide hot water, space heating and cooling.
  - the best location on the roof, and the optimum tilt and orientation of the collector panels.
  - function of the main components of an air or water-based solar space heating system.
  - schematic of the fluid circuit of an air or water- based space heating system.
  - main solar cooling system types.
- k) Energy rating schemes
- differences in approach used by house energy rating schemes in Australia.
  - energy performance of a number of houses using a computer simulation program such as NatHERS or BERS.
  - other methods to reduce energy consumption within and outside a building including appliance efficiency, human behaviour changes, building management strategies and transportation minimisation.
  - additional cost of energy efficiency measures and cost savings using life cycle cost or simple pay back methods according to Aust. Standard AS3595 and AS4536.
- l) Sustainable and safe building materials
- common building materials and their embodied energy content.
  - environmental impact of the production of various building materials.
  - problems associated with the use or disposal of building materials.

### 2.20.13 Photovoltaic installations

Evidence shall show an understanding of photovoltaic installations to the extent indicated by the following aspects:

- a) PV array installation requirements
- OH&S requirements and methods for working on roofs.
  - common methods of roof construction and methods to ensure integrity of waterproofing.
  - common types of roof mounted and free-standing PV array frame construction and methods of tilt angle adjustment.
  - fixing methods for different roof types.
  - array mounting methods for non-north facing roof sections.
  - aesthetic considerations in choosing an appropriate array location and type of mounting.
  - the mounting and fixing methods for at least one type of commercially available building integrated PV product.
- b) Electrical installation requirements (AS 4509)
- methods used in wiring and connecting PV arrays
  - considerations involved in wiring of series connected PV modules in order to minimise power losses due to shading.
  - PV array wiring diagram including the placement of blocking and bypass diodes.

- considerations involved in choosing the location of regulators, d.c. control board and batteries.
  - cable route from array to battery so as to minimise the route length.
- c) System installation and maintenance
- installation work on a PV power system in accordance with relevant standards and OH&S guidelines.
  - correct isolation and shutdown procedures prior to carrying out maintenance tasks.
  - hazards present and OH&S requirements when handling and installing batteries.
  - basic maintenance tasks on flooded lead acid and VRLA batteries.
  - routine maintenance tasks on PV arrays.
  - required vegetation control to remove or reduce shading or soiling on a PV array

### 2.20.14 Photovoltaic power systems

Evidence shall show an understanding of photovoltaic power systems to the extent indicated by the following aspects:

- a) Daily irradiation
- definition of the terms: declination angle, reflectance, sunshine hours, extraterrestrial irradiation
  - solar radiation data tables and contour maps.
  - determination, using field measurements and a sun path diagram, the times and dates when a PV array will be shaded by obstacles at a particular site.
  - calculation of the daily average irradiation on a horizontal plane given extraterrestrial irradiation, location constants and sunshine hour data.
  - calculation of the monthly mean daily irradiation falling on a PV array for each month of the year, adjusted for the effects of shading, using irradiance and irradiation data tables and a sun path diagram and/or appropriate software.
- b) Photovoltaic modules
- definition of the terms: mono-crystalline, poly-crystalline, amorphous, band gap energy, semi-conductor
  - diagram of a basic crystalline silicon PV cell, showing its physical structure, with at least five major features labelled
  - major steps in the production of PV modules based on bulk silicon cells, in comparison with the production of thin film PV modules.
  - basic physical principles of PV cell operation for the main types of commercially available PV modules.
  - efficiency, spectral response, cost and typical applications of the main types of commercially available PV modules.
  - new photovoltaic technologies currently being developed towards commercialisation, and their major features.
  - mechanical and electrical features necessary for the long life of a PV module under a wide range of operating conditions.
- c) Module characteristics
- definition of the terms: I-V curve, fill factor, operating point, maximum power point (MPP), cell temperature co-efficient, nominal operating cell temperature (NOCT), current, voltage and power output co-efficient.
  - equivalent circuit for a PV cell, labelling each of the elements and the polarity of

the terminals.

- family of I-V curves for a PV module, labelling major points and showing the effects of variation in irradiance and variation in cell temperature.
- major ratings of a PV module from manufacturer’s information or nameplate data.
- determination of the operating point of a PV module with a resistive load, a constant voltage source or any other load with known I-V characteristics, using the load line method.
- configuration of a typical PV array, including the function, placement and ratings of blocking and bypass diodes.
- the effect of partial shading of a PV module or array, the impact of bypass diodes and the significance of their configuration on output current in typical operating conditions.
- calculation of the power at MPP, and the power under typical battery charging conditions, of a PV module, given irradiance and ambient air temperature.
- calculation of the daily energy output of a PV array in accordance with AS 4509.2, and by using “rule of thumb” de-rating factors.
- advantages and disadvantages of MPPTs in water pumping applications and in battery charging applications.
- the scope and content of Australian or international standards relevant to the performance of PV modules.
- the electrical characteristics of a PV module according to relevant Australian or International standards, using an outdoor test method.

d) PV powered water pumping system

- selection of pump type appropriate for a given pumping application.
- sizing pipes and fittings for a given pumping application.
- calculation of the mechanical power required to pump the peak flow rate.
- selection and sizing the motor and mechanical transmission
- circuit schematic of a typical PV water pumping system showing all components.
- calculation of the required size of a fixed array.
- selection of a commercially available water pumping system for a particular application.

e) Stand-alone PV power system design

- detailed load assessment including the assessment of total daily energy, maximum demand, surge demand and load management requirements, consistent with AS 4509.2.
- determination of an appropriate system voltage and the size of major components in the system using appropriate calculations.
- selecting and sizing a PV array, given load and solar radiation data and using a method consistent with AS 4509.2.
- selecting and sizing suitable regulators, inverter, battery, battery charger and backup generator for a given load and PV array size, in accordance with AS 4509.2.
- selecting and sizing suitable metering, switches, cabling, cabling hardware, protection and isolation devices and electrical enclosures for a PV RAPS system in accordance with AS 4509 and AS/NZS 3000.
- suitable material and design for a PV array mounting frame in a given application in accordance with AS 4509.

- battery accommodation in accordance with AS 4086.2, AS 4509.1 and AS 4509.2.
- complete design of PV power system using a series or switched configuration, consistent with the guidelines set out in AS 4509.2.
- estimation of the capital cost and running costs for the PV system, accounting for government rebates or other incentives.
- computer based tools for: load assessment, selection and sizing of components, life cycle costing
- compare the capital cost, simple pay back time and life cycle cost of a PV power system with another power supply option.
- produce a System Manual according to AS 4509.2 and AS 4509.3.

f) Grid connected PV systems

- operation of grid interactive PV systems including synchronisation, safety features, power flow control and metered energy for systems with and without energy storage.
- selecting and sizing a PV array for a grid connected inverter system, based on any of: annual energy demand, budget constraints, architectural constraints or limitations on available inverter sizes.
- schematic diagrams of common grid connected inverter circuit configurations with or without energy storage including metering arrangements, isolation and connection with respect to RCDs.
- major installation details for a proposed grid connected inverter system, based on the requirements set out in AS 4777 Parts 1 to 3.
- selecting and sizing an inverter and balance of system components including cabling, circuit protection and isolation equipment for a grid connected PV system with or without energy storage.
- major non-technical considerations impacting on the design, installation and operation of grid connected PV systems including economic, financial, contractual, institutional, legislative and regulatory.
- annual reduction in greenhouse gas emissions achieved by a given PV power system at a given location.

g) Installation and commissioning

- suitable location for the PV array, batteries and other components at a given installation site in accordance with AS 4509 and AS 4086.2.
- major installation requirements for all system components which will ensure correct operation, long life, safety and ease of maintenance consistent with AS 4509, AS 4086.2, AS/NZS 3000 and relevant OH&S guidelines.
- start-up and shut-down procedures as well as a commissioning procedure for a PV power system in accordance with AS 4509.
- test on a PV system to determine correct operation.
- installation and commissioning work on a PV power system in accordance with AS 4509, AS 4086.2, AS/NZS 3000 and AS 3010.1.

h) Maintenance and fault finding on a PV power system

- the safety hazards associated with gensets.
- installation and maintenance procedures on gensets using safe work practices in accordance with OH&S guidelines.
- basic periodic servicing requirements for a genset.
- testing gensets for correct operation

- electrical faults within a PV array, or in any other part of the system.
- maintenance requirements for a commercially available stand-alone power system battery, in accordance with AS 4086.2 and AS 4509.3 and manufacturer's specifications.
- maintenance schedule for a stand-alone PV power system.
- testing and maintenance tasks required for stand-alone PV systems in accordance with AS 4086.2 and AS 4509 and relevant OH&S regulations.

### 2.20.15 Renewable energy system electronics

Evidence shall show an understanding of renewable energy system electronics to the extent indicated by the following aspects:

#### a) Semiconductor components

- symbols for common semiconductor components including rectifier diodes, LEDs, zener diodes, bipolar transistors, Darlington pairs, MOSFETs, IGBTs, SCRs, and triacs.
- basic function of these devices above.
- major rating parameters of device above.
- applications for each device.
- I-V characteristics of diodes and the current gain characteristic of bipolar transistors.

#### b) Linear regulated d.c. power supplies

- label circuit diagrams for half wave and full wave, single phase and three phase rectifiers.
- voltage and current waveforms for these rectifier circuits with and without capacitor filtering
- peak output voltages from single phase and three phase rectifier circuits.
- block diagram showing the structure of a regulated DC power supply.
- main features of linear integrated circuit voltage regulator ICs.
- each of the major components and their physical location in a regulated power supply.

#### c) Switching power control circuits

- power dissipation of a transistor when operated as a switch.
- how Pulse Width Modulation (PWM) can provide a variable output voltage from a switch mode regulator.
- advantages and disadvantages of switch mode power circuits compared with linear power circuits.
- block diagram of a basic PV switching voltage regulator for battery charging.
- applications of switch mode circuits found in renewable energy systems.
- how power control in AC circuits is achieved using SCRs and triacs.
- methods used to reduce radio frequency interference (RFI) in DC and AC circuits utilising high speed switching.

#### d) Digital electronic circuits

- characteristic features that distinguish analogue and digital devices and circuits.
- how numbers or text information can be represented using binary numbers and how these are represented in digital circuits.

- operation of voltage comparators, Analogue to Digital (A-D) converters, and Digital to Analogue (D-A) converters, and give one example of each one's use in a renewable energy application.
- basic function of microcontrollers, volatile and non-volatile memory devices.
- operation of a solar hot water system pump differential controller, as an example of the use of logic in digital circuits.

e) Inverters

- basic function of inverters and d.c.-d.c. converters and their use in renewable power systems.
- the operation of an inverter bridge and half-bridge.
- output voltage waveforms for square wave, modified square wave and synthesised sine wave inverters showing typical voltages and timing.
- the function of PWM techniques in modified square wave and synthesised sine wave inverters.
- block diagrams showing the structure of common forms of d.c.-d.c. converters and inverters used in renewable energy applications.

f) Maintenance

- safety procedures for work on electronic systems, circuits and apparatus.
- hazards that may be encountered when performing tests on inverters, battery chargers or other equipment containing LV circuits.
- functionality of electronic equipment through appropriate client questioning and application of systematic tests and observation.
- various types of common faults and their causes in renewable energy electronic equipment.
- typical test equipment used to repair electronic and electrical equipment
- safe and correct use of tools and test equipment to locate electronic equipment faults under the direction of an electronics technician.
- replacement of circuit boards, observing appropriate handling precautions for static sensitive devices.
- replacement of socketed ICs such as EPROMs or microprocessors, using appropriate tools and methods.

### 2.20.16.1 Fundamentals of wind energy conversion

Evidence shall show an understanding of wind energy conversion systems (WECS) fundamentals to the extent indicated by the following aspects:

- a) Basic operation of lift and drag type WECS
- b) Characteristics of WECS in terms of power and torque, efficiency (power and output coefficients), solidity and tip speed ratio.
- c) Major categories and sub-categories of WECS.
- d) Advantages and disadvantages of each type of WECS.
- e) Suitable materials for the construction of WECS taking into consideration fatigue stresses and environmental conditions such as salt air, humidity and ice.
- f) Typical system configurations and components for: stand-alone power systems and water pumping.
- g) Strategies and/or mechanisms to control: mechanical stresses on the WECS in gale force winds and power output for battery charging.
- h) Appropriate types of WECS for a particular application.

### 2.20.16.2 Wind energy conversion systems

Evidence shall show an understanding of wind energy conversion systems (WECs) to the extent indicated by the following aspects:

a) Wind characteristics

- definition of the terms: weather charts, isobars, fronts and troughs, cyclone and anti-cyclone, atmospheric boundary layer, geostrophic wind, gradient wind, wind shear, wind rose
- major global wind circulations and the formation of major wind flows over your continent.
- major features of the atmospheric boundary layer including: variation of wind speed with height according to logarithmic and power Laws, effects of surface roughness
- atmospheric stability and temperature inversions turbulence.
- major local winds including: trade winds, sea and land breezes, katabatic and anabatic winds.
- likely effects on the major local winds from local topography, surface roughness, isolated barriers and temperature inversions.
- typical diurnal, monthly and seasonal patterns of winds over the local area.
- the formation and likely effects of extreme winds and wind shear.

b) Wind speed data measurement and analysis

- definition of the terms: porosity, internal boundary layer, speed-up factor, temperature inversion factor, wind speed frequency distribution, lull period, calms.
- interpretation of local and regional wind speed and direction data such as local records (Eg. Meteorological Bureau data), ecological indicators and wind speed/energy maps.
- wind speed and direction using data logging anemometers.
- manufacturer's calibration curves for anemometers to correct recorded data.
- calculation at a site, monthly and yearly average wind speed, and wind power density from existing, nearby data or on-site measurements, using appropriate software
- estimation of the wind speed at a WECS tower of suitable height and location given: wind speed data recorded at two or more elevations at the site, and wind speed data recorded at one elevation and appropriate surface roughness, temperature inversion and speed-up factors at the site.

c) Site selection

- the likely effects of local topography, surface roughness, isolated barriers and temperature inversions on a WECS at a given site.
- assessment of available local or regional wind speed, wind energy and direction data.
- selection of the most appropriate site-monitoring location taking into consideration factors such as: topography, accessibility, surface roughness, shielding from isolated barriers (obstacles), turbulence, temperature inversions, power transmission distance, environmental and heritage impacts eg. noise, visual, bird life, national parks or aboriginal sites.
- measurement of wind speed and direction data at an appropriate site and height(s) using a data logging anemometer over a sufficient period of time.

- analysis of the recorded wind speed and direction data to determine if the site is suitable for wind energy utilisation.

d) Selection of WECS

- selection of suitable WECS specifications to suit site load and wind speed data according to AS4509 including: cut-in, rated and furling wind speeds, blade diameter, rated power at an appropriate rated wind speed, materials of construction.
- select a suitable commercially available WECS that most closely fits the specifications above.
- suitable tower requirements at the site including site access, soil type and foundations, structural certification and planning approvals.
- calculation of the monthly and annual energy output of the selected WECS at the site from wind speed data and load data using appropriate computer software and in accordance with AS4509.
- height of the tower and the size of the WECS for optimum use.
- suitable system configurations.
- balance of system components including: battery storage, inverter, regulator, transmission cable, back-up battery charger and generator.
- equipment reliability and manufacturer/suppliers back-up service including availability of spare parts and service personnel
- installed capital and life cycle costs of various system configurations according to AS3595 and AS4536.
- environmental, cultural and social factors that impact on the implementation of a WECS such as: external costs, WECS manufacturing processes and embodied energy and energy payback time, noise levels, visual amenity, RFI.

e) Installation and maintenance of a WECS

- select an appropriate tower for the installation of a WECS taking into consideration: soil type and footings, local council approvals, appropriate codes such as AS1170.2, transport of tower.
- appropriate methods, using appropriate safety procedures, for: raising tower and WECS, lightning protection, tower maintenance, safety in the erection and maintenance of the tower and WECS, site management to minimise environmental impacts.
- appropriate electrical transmission voltage and cable size from the WECS to the load or energy storage.
- appropriate installation, commissioning, fault diagnosis and rectification, and maintenance methods using appropriate safety procedures. This will include: WECS power output, voltage regulation, transmission cable voltage drop, manual and automatic furling, shut-down.
- schematic and wiring diagrams for the WECS showing the general circuit layout and protection between the WECS, energy storage, inverter and loads according to AS/NZS 3000, AS4509 and lightning protection requirements.
- suitable layout for the location of energy storage to meet AS/NZS 3000, AS 3011.1 and AS4509.
- safety procedures for the installation, commissioning, fault diagnosis and maintenance of system components.
- maintenance schedule for the system.

### 2.20.17.1 Micro-hydro systems installation and maintenance processes

Evidence shall show an understanding of micro-hydro systems (MHS) installation and maintenance to the extent indicated by the following aspects:

- a) Selection of an appropriate MHS taking into account the topology of the site, local council approvals, environmental considerations, site access and transport of equipment, water and power transmission distances and daily and seasonal load profiles.
- b) Appropriate methods, using appropriate safety procedures, for: dam or weir construction; watercourse construction and/or penstock installation; turbine installation;
- c) Appropriate installation, commissioning, fault diagnosis and rectification procedures and maintenance methods using appropriate safety procedures.
- d) Maintenance schedule for the system.
- e) Schematic and wiring diagrams for the MHS showing the general circuit layout and protection between the MHS, batteries, inverter and loads according to Australian Standards AS3000, AS4509, and AS4086.2 requirements.
- f) Safety procedures for the installation, commissioning, fault diagnosis and maintenance of system components.

### 2.20.17.2 Micro-hydro systems

Evidence shall show an understanding of micro-hydro systems (MHS) to the extent indicated by the following aspects:

- a) Site evaluation
  - definition of the terms: potential and kinetic energy, micro-hydro system, gross head, net head, flow rate.
  - available head at a site using a dumpy level or theodolite, altimeter, pressure gauge and contour maps.
  - the accuracy, advantages and disadvantages of each method for flow and head assessment.
  - the flow rate of a given site using each of the following methods - catchment area calculations, water diversion to fill a container, stream velocity/area measurement and/or weir construction method.
  - advantages and disadvantages of each method of head and flow measurement with particular reference to their accuracy.
  - long term usable flow rate from long term stream flow if available able taking into account environmental considerations.
  - effects of seasonal variation using long term weather data.
  - typical daily and seasonal energy consumption profile at a given site.
  - effect of the energy demand profile both daily and seasonally at the site on the system sizing.
  - government regulatory requirements such as those covered under environmental or water resource legislation.
  - environmental constraints at a site including minimum stream flow rates, ecological impacts, visual and noise impacts.
- b) System components and configuration
  - structural differences between the Pelton, Turbo Impulse, Francis, propeller type, Michell or Banki cross flow turbines and PATs (Pumps As Turbines).
  - system configuration for each turbine type identifying all major components.
  - for impulse and cross flow turbine types, the comparison of bucket and blade

shapes, nozzle shapes and types, types of hydraulic and electrical controllers/governors, speed increasers and over speed clutches and their basic operation and appropriate application.

- operational parameters and efficiency of different turbines.
- circumstances under which battery storage would be used.
- respective merits and suitability of various turbine types for various micro hydro-electric applications.
- operation of hydraulic rams or similar water pumps.
- typical efficiencies of hydraulic ram systems and appropriate applications.
- advantages and disadvantages of water energy storage systems with other energy storage systems such as battery banks.

#### c) System design

- suitable MHS characteristics to suit site load, hydraulic head and stream flow rate characteristics and a suitable type of commercially available MHS to suit.
- frictional losses in delivery pipes using manufacturer's data.
- calculation of the energy output of the selected MHS at the site from water flow rate, head and manufacturer's data, allowing for seasonal variations in performance and environmental constraints.
- design of any required weirs or dams, open races or penstocks, strainer and intake systems.
- optimum the position of the MHS and size of the MHS.
- suitable balance of system components including delivery pipe and fittings, transmission cable and voltage, voltage and frequency regulation, battery storage type and capacity, battery charger, inverter, back-up generator, and load dump.
- likely environmental impacts of the MHS and appropriate measures to minimise these impacts.

#### d) System costing

- major costs to be considered in the life cycle costing method.
- calculation of the capital and life cycle cost that includes the cost of various system configurations for a micro hydro application.
- external costs that might impact on the cost effectiveness of a MHS.
- most cost effective of a number of options on the basis of life cycle costing analysis.

### 2.20.18 Solar water heating systems

Evidence shall show an understanding of solar water heating systems to the extent indicated by the following aspects:

#### a) Daily irradiation

- definition of the terms: declination angle, reflectance, sunshine hours, extraterrestrial irradiation.
- solar radiation data tables and contour maps.
- determination, using field measurements and a sun path diagram, the times and dates when a PV array will be shaded by obstacles at a particular site.
- calculation of the daily average irradiation on a horizontal plane given extraterrestrial irradiation, location constants and sunshine hour data.
- calculation of the monthly mean daily irradiation falling on a PV array for each

month of the year, adjusted for the effects of shading, using irradiance and irradiation data tables and a sun path diagram and/or appropriate software.

b) Energy balance

- definitions of the terms: transmittance, absorptance, emittance, specific heat, absorber, heat removal factor, stagnation temperature.
- explain the heat transfer mechanisms of conduction, convection and radiation and their operation in a simple fin and tube collector.
- how the transmittance, absorptance and emittance properties of materials used in the collector affect the performance of the collector.
- ways to reduce heat losses from a collector.
- energy balance and instantaneous efficiency equations for a collector.
- calculation of the collector constants from the instantaneous collector efficiency equation for a linear relationship.

c) The solar collector

- five major factors that affect the selection of materials for solar collectors.
- features of collectors for low, medium and high temperature applications in terms of heat transfer, optical properties and materials of construction.
- the scope and content of AS 2712 or similar standards.
- requirements of AS 2712 or similar standards in one aspect of collector construction.
- tests required by AS 2712 or similar standards with regard to collector construction.

d) Solar collector performance

- scope and content of Australian Standards AS 2535 and AS 2984 or similar standards.
- method for testing the thermal performance of a solar collector or a solar water heater according to AS 2535 and AS 2984 or similar standards.
- instantaneous efficiency of a solar collector for different inlet temperatures and flow rates.
- effect of varying inlet temperature and flow rate on the performance of a solar collector.
- efficiency curves for various types of solar collectors.
- performance of various types of solar water heaters in terms of their design, location and predicted solar fraction.

e) Hydraulic circuits

- definition of the terms: equivalent length, static head, dynamic head, heat exchanger.
- configuration of a hydraulic circuit for a pumped storage solar water heating system.
- function of the components in the circuit.
- effects of water quality on the life and performance of components in the hydraulic circuit.
- suitable type and size components to minimise hydraulic and energy losses including pipes, pumps, heat exchangers, expansion tanks, valves and filters for a hydraulic circuit with a given flow rate and head.
- safety requirements of the hydraulic circuit in terms of temperature, pressure and hydrogen gas release.
- requirements to balance flow through parallel/series combinations of collector

arrays.

- suitable water and energy conservation measures including user education, water conservation technologies and insulation.
- suitable types and level of insulation for system components to minimise heat losses.

f) Domestic solar water heaters

- definition of the terms: thermosiphon system, pumped storage system, sacrificial anode.
- function of the components in a domestic solar water heater including the collector, storage tank, valves, piping, differential controllers, pumps, insulation and support frames.
- schematic diagram of different types of system configurations showing collectors, storage tank, piping, pumps, filters, valves, heat exchangers and expansion tanks.
- factors which affect system performance including: storage tank and collector design, system location and collector orientation, water quality, hot water demand, usage pattern.
- safety requirements that prevent injury from high temperature water and hydrogen gas explosions during installation, maintenance and use of solar water heaters.
- demand for hot water and irradiation for a given location and collector tilt angle, orientation and shading.
- selection a suitably sized system for a given demand and location to meet a specific solar fraction and/or minimise life cycle cost.
- consequences of under/oversizing of solar water heating systems in terms of: the effect on system performance, safety, life expectancy of components.
- installation, commissioning and maintenance requirements for a given situation including location and mounting of collectors, storage tanks, valves, pumps, pipes and ancillary fittings.
- energy conservation and efficiency measures that will enhance the performance of a solar water heater such as: appropriate usage patterns, insulation, water conservation technologies, auxiliary energy tariffs.
- the capital cost, simple pay back and life cycle cost of solar and electric or gas hot water heaters according to AS 3595 and AS4536.

g) Commercial solar hot water heaters

- schematic diagrams for two different types of system configurations showing collectors, storage tank, piping, pumps, filters, valves, heat exchangers and expansion tanks.
- steps involved in the design of a commercial solar water heating system.
- assessment of the demand for hot water and irradiation for a given location and collector tilt angle, orientation and shading.
- selection of a suitably sized system for a given demand and location to meet a specific solar fraction and/or minimise life cycle cost.
- consequences of under/oversizing of a solar water heating system in terms of: system performance, safety, life expectancy of components.
- installation, commissioning and maintenance requirements for a given situation including location and mounting of collectors, storage tanks, valves, pumps, pipes and ancillary fittings.
- evaluation of energy conservation and efficiency measures that will enhance the performance of a solar water heater such as: appropriate usage patterns, insulation,

- water conservation technologies, auxiliary energy tariffs.
  - the capital cost, simple pay back time and life cycle cost of solar and electric or gas hot water heaters according to AS 3595 and AS4536.
- h) Pool solar hot water heaters
- function of the components of solar pool heating systems.
  - typical system configuration.
  - two factors which affect system performance.

### **2.20.19 Grid connected inverters**

Evidence shall show an understanding of grid connected inverters to an extent indicated by the following aspects:

- a) Basic function of an inverter, including the output waveforms of different types.
- b) Operation of an inverter bridge and half-bridge.
- c) Function of PWM techniques in modified square wave and synthesised sine wave inverters.
- d) Characteristics which distinguish inverters suitable for grid connected photovoltaic array application from standard inverters.
- e) Operation of grid interactive PV systems including synchronisation, power flow control, passive and active anti-islanding, and metered energy for systems with and without energy storage.
- f) Installation requirements for grid connected inverters

### **20.2.20 Renewable energy heating**

Evidence shall show an understanding of renewable energy heating to an extent indicated by the following aspects:

- a) Heating system technologies encompassing:
  - Types and their application
  - Operating parameters of common systems
- b) System component parameters and specifications
- c) System performance and requirements
- d) Installation specifications and requirements

### **2.20.21 Distributed generation**

Evidence shall show an understanding of distributed generation to an extent indicated by the following aspects:

- a) Structure of the existing generation, transmission and distribution system
- b) Benefits, issues and impacts
- c) Distributed generation technologies
- d) Electrical power distribution systems operation encompassing:
  - Electrical characteristics of feeders
  - Causes of voltage problems in a power distribution system
  - Voltage regulation limits
  - Calculations for feeder voltage drops
  - Methods of voltage control

- Fault types, causes and effects
  - Determination of fault levels
  - Fault level limitation
- e) Protection and relaying encompassing:
- Protection system purpose and features
  - Application of protection in a distribution network
  - Protection system terminology
  - Feeder protection systems
- f) Distributed generation issues encompassing:
- Utility requirements for interconnection
    - Safety of personnel
    - Islanding
    - Grid Stability
  - Voltage regulation
  - Potential benefits of DG
  - Limitations in design of distribution circuits (designed for 1-way operation)
  - Match between supply and demand
  - Operation: dispatchable and non-dispatchable supplies
  - Factors affecting the sizing of distributed generation
  - Use of energy storage
  - Case studies
- g) Renewable energy supplies issues encompassing:
- Limits to penetration
  - Factors affecting the value of renewables on the grid
  - Implications of renewable input on power system operation
  - Connection of energy systems via inverters: AS 4777
- h) Factors affecting the uptake of distributed generation encompassing:
- Institutional factors
  - Regulatory factors
  - Policy including mandated targets
  - Green power market
  - Financial issues
  - Contractual issues
  - Case studies

## 2.21 System, control and automated

### 2.21.1 Machine design and positioning

Evidence shall show an understanding of the design parameters of machines and their capability as well as the ability to redesign their operating performance as well as the location of machines in an assembly or manufacturing environment to maximise production efficiency to an extent indicated by the following aspects:

- a) Materials used in machine drive shafts
- b) Standard formulas and specifications to determine machine drive shaft sizes for power, deflection, torque, bending data, key sizes, spline size and pin size
- c) Selection of power prime movers from manufacturers catalogues
- d) Principles associated with systematic planning of material flow in a production process
- e) Adaptation of systematic layout planning to a production process
- f) Preparation of process layouts and materials flow patterns in a production process
- g) Materials handling methods and unit load concepts
- h) Types of materials handling systems
- i) Design of materials handling systems and the factors that guide the final selection of a system

### 2.21.2 Mechanical drives and engineering

Evidence shall show an understanding of mechanical drive components and engineering design concepts to an extent indicated by the following aspects:

- a) Function of common mechanical drive parts and components
- b) Australian Standards governing the design of parts and components in a drive system
- c) Selection criteria for a part or component or drive system to suit a particular application
- d) Design philosophy applicable to mechanical, civil and electrical engineering
- e) Essential features of a design specification
- f) Understanding of Australian Standards and Codes of practice for design
- g) Steps in a designing a design
- h) Ergonomics in design

### 2.21.3 Materials and strength of materials

Evidence shall show an understanding of materials used in engineering and the mechanical properties of these materials to an extent indicated by the following aspects:

- a) Structure of metals, polymers and ceramics
- b) Interpretation of phase equilibrium and isothermal transformation diagrams
- c) Heat treatment processes of low carbon steel, high carbon steel and tool steel as well as non-ferrous metals such as aluminium and copper
- d) Properties and specifications of metal and non-metal materials
- e) Common failures in materials
- e) Determining normal stresses, strains and deformations caused by axial load
- f) Shear stress on bolted connections
- g) Failures in fillet welds and determine appropriate weld size and length required on welded connections

- h) Centroid and second moment of gyration of plain figures
- i) Shear force and bending moment diagrams for supported and cantilever beams subjected to vertical point loads and UDLs
- j) Bending stress in beams
- k) Deflection of beams subjected to loads
- l) Torque distribution diagrams and calculation of torsional shear stress and angle of twist on circular shafts subjected to torque
- m) Coefficient of linear expansion to determine thermal stress in single members caused by restraint and changes in temperature

#### **2.21.4 Statics and dynamics**

Evidence shall show an understanding of statics and dynamics to an extent indicated by the following aspects:

- a) Units of mass, length, time and force and distinguish between vector and scalar quantities
- b) Resultant and equilibrant of systems of coplanar concurrent and non-concurrent forces
- c) Principles of movement
- d) Reactions of structures using equations of equilibrium and including the moment effect of a couple
- e) Laws of dry sliding friction applicable to horizontal and inclined planes
- f) Reactions and internal forces acting on the members of a pin jointed framed structure subjected to point loads at the joint
- g) Pin and support reactions for a non-coplanar non-concurrent force system
- h) Linear and angular equations of motion for constant accelerations
- i) Principles of the conservation of energy
- j) Mechanical advantage, velocity ratio and efficiency of machines
- k) Acceleration experienced by connected bodies so their motions are dependant upon one another
- l) Principle of conservation of momentum related to elastic collisions and departure masses

#### **2.21.5 Advanced fluid mechanics**

Evidence shall show an understanding of advanced fluid mechanics to an extent indicated by the following aspects:

- a) The relationship between Reynolds Number and flow regime
- b) Head loss in pipes and fittings and system head curves
- c) Head loss in parallel and serial pipes and how systems can be reduced to an equivalent single pipe system for analytical purposes
- d) Flow rates through open channels
- e) Positive displacement and rotodynamics of fluid machinery
- f) Duty point for a pump in a system including flow rate and head pressure
- g) Cavitation and the influence of inlet system design and fluid temperature and pressure on cavitation
- h) Circuits and operation of fluid hydraulic componentry in a system
- i) Technical specifications and associated data for the selection of hydraulic components for machine control operation
- k) Installation requirements for the installation, commissioning and testing hydraulic components and systems

### **2.21.6 Electronic interfacing to mechanical processes**

Evidence shall show an understanding of interfacing electronics with mechanical devices and systems to an extent indicated by the following aspects:

- a) Connection of sensors and actuators to an interface for communications with a discrete device electronic controller or programmable controller or computer for the operation of a process requiring continuously variable changes
- b) Description of the logic sequence for the integrated system including: operator actions, input signals, output actions, interlocks and safety and emergency requirements
- c) Transformation of the system logic into a program to carry out the desired task using a port address on a computer using programming software and codes
- d) Commissioning systems and perform fault diagnosis using computer automation
- e) Operation of circuits controlling hydraulics
- f) Technical specifications and data for the selection of hydraulic components for machine control
- g) Installation, commissioning and testing hydraulic systems

### **2.21.7 Electronic control of fluid processes**

Evidence shall show an understanding of interfacing electronics with hydraulic and pneumatic devices and systems to an extent indicated by the following aspects:

- a) Determining control static and dynamic operating conditions for stages in a control process from block diagrams
- b) Identification of process characteristics from process test data and process flow diagrams
- c) Linearisation functions and feedback
- d) Placement of sensors and actuators to eliminate dead time
- e) Lag reduction strategies
- f) Consideration of steady state gain vs offset and stability vs performance
- g) Controller tuning and calibration
- h) Analyse control system functions
- i) Construct a time-displacement diagram for a functional system
- j) Design relay logic ladder diagram for the system
- k) Identification of components required by a fluid power circuit
- l) Selection of proportional valves to suit fluid applications
- m) Determination of ramp time from motor and cylinder circuits
- n) Determine maximum flow rates in cylinder circuits that accelerate and decelerate a load and selection of an appropriate valve spool
- o) Determine pressure in cylinder circuits
- p) Design fluid power circuits using proportional valves
- q) Adjust points on a proportional valve control card to meet specifications

### **2.21.8 Electronic interfacing to robotic processes**

Evidence shall show an understanding of interfacing electronics with robot functions to an extent indicated by the following aspects:

- a) Robot types and selection and pre-selection planning
- b) Robot installation including pre-installation design, layout and system documentation
- c) Interfacing of robot controller with other external control systems

- d) Robot sensor devices, characteristics and application
- e) Diagnostic functions
- f) Maintenance scheduling and procedures
- g) Special features including safety, palletising and sub-routines

### **2.21.9 Material science**

Evidence shall show an understanding of materials and their characteristics to an extent indicated by the following aspects:

- a) Classification of materials on the basis of state
- b) Difference between elements, compounds and mixtures
- c) Atomic structure and bonding of materials
- d) Properties of ferrous and non-ferrous materials
- e) Properties of ceramic and composite materials
- f) Chemical, physical and mechanical properties of materials
- g) Corrosion and corrosion protection of metallic structures and systems
- h) Causes of degradation of polymer materials
- i) Non-destructive testing and types of test equipment
- j) Corrosion testing
- k) Evaluation and suitability of materials for specific applications
- l) Principles, advantages and limitations of casting, forging, extrusion and powder metallurgical processes
- m) Methods of joining materials, including limitations
- n) Methods used for surface finishing of materials, including limitations

### **2.21.10 Thermodynamics**

Evidence shall show an understanding of thermodynamics to an extent indicated by the following aspects:

- a) Relationship between energy usage and standard of living
- b) Energy conversion and conversion efficiencies
- c) Energy sources and their advantage in engineering processes
- d) Energy conservation
- e) State of matter in terms of molecular theory
- f) Relationship between mass, volume, density, force, pressure and temperature in thermodynamic concepts
- g) Compression ratio and pressure ratio calculations in a basic piston and cylinder mechanism
- h) Concepts, theorems and calculations related to potential energy, kinetic energy, work and power, heat and internal energy of object.
- i) Relationship between work and pressure/volume
- j) Concept and calculations related to energy transfer in a closed loop system
- k) Concept of and calculations about property changes and work, heat and internal energy transfer in gases in typical engineering processes
- l) Principle, operation and performance of common types of heat engines
- m) Heat engine performance parameters and typical performance tests

### **2.21.11 Pneumatics**

Evidence shall show an understanding of pneumatics to an extent indicated by the following aspects:

- a) Terms and their definitions used in pneumatic components and systems
- b) Application, operation and installation requirements of pneumatic components and systems
- c) Interpretation and selection of manufacturers equipment specifications to establish the performance of pneumatic components
- d) Construct circuits from control diagrams
- e) Location and correction of faults on pneumatic components and systems

### **2.21.12 Hydraulics**

Evidence shall show an understanding of hydraulics to an extent indicated by the following aspects:

- a) Terms and their definitions used in hydraulics components and systems
- b) Application, operation and installation requirements of hydraulics components and systems
- c) Interpretation and selection of manufacturers equipment specifications to establish the performance of hydraulics components
- d) Construct circuits from control diagrams
- e) Location and correction of faults on hydraulics components and systems

### **2.21.13 Fluid power control**

Evidence shall show an understanding of fluid power control to an extent indicated by the following aspects:

- a) Terms and their definitions used in fluid power systems
- b) Applications of fluid power
- c) Pascal's law as it relates to force transfer, multiplication and intensification
- d) Mathematical relationships involving temperature and volume (Charles law), pressure and volume (Boyles law), pressure and volume (Boyles law) and their combinational relationships
- e) Fluid power principles related to components and the identification of components
- f) Operation of fluid power components
- g) Interpretation of fluid system operation from circuit diagrams
- h) Operation and construction of basic pneumatic circuit
- i) Operation and construction of a basic hydraulic circuit
- j) Routing maintenance procedures
- k) Safety requirement

## T2.4 HV Switching

### T2.4.3 High voltage switching principles

Evidence shall show an understanding of high voltage switching principles to an extent indicated by the following aspects:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings encompassing:
  - Types, characteristics and capabilities of electrical apparatus
  - Use, characteristics and capabilities of specialised tools and testing equipment
  - Network interconnectors source of possible backfeed
- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching encompassing:
- Types of operational forms, access authorities and permits
- Purpose and procedure for operational forms, access authorities and permits
- Use and operation of equipment associated with HV overhead and substation equipment encompassing:
  - Test instruments
  - Sticks
  - Interrupters
  - Arc strangles
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access encompassing:
  - Purposes of “Operational” and additional work part “on-site” earths
  - Factors determining the location and effectiveness of “Operational” earthing
  - Acceptable industry procedures
  - Personal protective equipment
- High voltage switching techniques
- Operate switching apparatus encompassing:
  - Identifying hazards, assessing and controlling risks associated with HV switchgear operation
  - Systematic and defensive techniques
  - Mobile radio procedures
  - Double isolation procedures

### T2.4.4 High voltage fault switching principles

Evidence shall show an understanding of high voltage fault switching principles to an extent indicated by the following aspects:

- Primary causes, effects and types of HV electrical faults

- HV protection devices encompassing:
  - Main components
  - Types
  - Categories
  - Applications
  - Functions
- Basic principle of operation of HV system protection devices
- Protection co-ordination and protection “zoning”
- HV feeder auto-reclosing suppression encompassing:
  - Function
  - Application
- Circuit condition requirements and switching considerations when paralleling and separating HV feeders

#### **T2.4.5 High voltage distribution transformer principles**

Evidence shall show an understanding of high voltage distribution transformer principles to an extent indicated by the following aspects:

- Operation of HV distribution transformers encompassing:
  - Principle governing factors for transformer ratings
  - Protection and alarms
  - Operating limitations and the relationship between transformer and HV fuse rating
  - Purpose and principle operation of HV distribution transformer tap changers
  - HV distribution transformer and transformer - cable combination switching practices
  - Paralleling requirements
  - Isolation and earthing procedures for access
  - Common distribution transformer and associated electrical apparatus faults
- HV underground switching equipment
  - Note:  
Examples include arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F & G switching cubicles, voltage indicators and phasing testers

#### **T2.4.6 High voltage SWER system**

Evidence shall show an understanding of high voltage SWER system to an extent indicated by the following aspects:

- Application and function of SWER system components
- Circuit arrangement
- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems
- Procedure to isolate, energise and commission SWER substations

#### **T2.4.7 Feeder automation system**

Evidence shall show an understanding of feeder automation system to an extent indicated by the following aspects:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station

- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2**

**Volume 2 – Part 3  
Language, Literacy and Numeracy**

**Volume 2 of 2**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## Volume 2 Part 2.3

### 2.3.1 Language, Literacy and Numeracy

The reading, writing and numeracy skills/competencies in each competency standard unit describe the recommended prerequisite entry requirements typically needed to successfully achieve competence in the unit. A nationally-recognised language, literacy and numeracy framework has been used to provide advice as to the relevant entry level required.

The information has been derived from the '*National Reporting System*' report, '*A mechanism for reporting outcomes of adult English language, literacy and numeracy programs*'. The Australian National Training Authority (ANTA) and the Department of Employment Education and Training (DEET), 1994-5, jointly funded the report. Australian Training Products Ltd (ATP) distributes it for and on behalf of Language Australia Victorian Office. Stock code 3010A, ISBN: 0 7306 7493 2, April 1999.

The report:

- identifies adult English language, literacy and numeracy competencies in industry
- facilitates student pathways
- generates ideas for curriculum and assessment

The report identifies a national framework of five vertical levels of competence related to complexity of language, literacy and numeracy competence. Six interrelated horizontal aspects of communication were found to apply in relation to differing orientations of social activity involving reading, writing, speaking, listening and/or numeracy. These were categorised as follows: Procedural Communication for performing tasks; Technical Communication for using technology; Personal Communication for expressing identity; Cooperative Communication for interacting in groups; Systems Communication for interacting in organisations; and Public Communication for interacting in the wider community.

The National Reporting System Report: A mechanism for reporting outcomes of adult English language, literacy and numeracy, should be referred to at all times for clarification, more detailed information and advice.

For the purposes of providing relevant entry-level advice, specific features of writing, reading and numeracy competencies have been selected from the five-level competence structure using the Technical Communication aspect of the national framework. These are outlined in the Table below. Registered Training Organisations should use this information to assist them in developing appropriate entry-level learning strategies, to assist learners meet the entry-level requirements of specific competency standard units.

## Table 6 – Reading, Writing and Numeracy – Indicators of Competence

These five levels of competence are interrelated with six aspects of communication of the National Reporting System (NRS). The NRS suggests that the ‘*report of a person’s competence derives from the interplay between the chosen activity, the features of the text/task, and the context and level of support under which the activity is performed*’. **Note:** These indicators of competency are not an assessment system and not a recruitment instrument for employers. They are not a curriculum; not a model of language acquisition; not a means for categorising students in terms of a simple ‘level’; not a set of ‘broad’ competency statements, but specific to reading writing and numeracy.

### Reading

Scale	IoC*	Indicators of Competence	Technical Communication
5	5.1	Reads and interprets structurally intricate texts in chosen fields of knowledge and across a number of genres, which involve complex relationship between pieces of information and/or propositions.	Defines the purpose and objectives for the use of a particular technology, eg writes a report, which includes a detailed analysis of technology as, applied in a particular workplace or environment. Draws on prior knowledge of the application of technology in researching the capacity of a new system, eg writes a briefing and recommends purchase or use of a particular system.
	5.2	Interprets subtle nuances, infers purpose of author and makes judgements about the quality of an argument.	Uses technological principles to reduce constraints presented by environmental or physical capacity, eg writes a report, which compares the effectiveness and efficiency of manual and computerised record management systems.
	5.3	Reads and critically evaluates texts containing data which includes some abstraction, symbolism, and technicality presented in graphic, diagrammatic, formatted or visual form.	Prepares a written or oral report, which critically evaluates the content, structure, and purpose of technical texts including graphic, diagrammatic or numerical information. Adapts task instructions to suit changes in technology, eg writes plain English instructions for the operation of a new machine based on the manufacturer’s instructions. Draws from a number of sources and uses computer skills to prepare a report, eg CV and job application letter.
4	4.1	Reads and interprets structurally intricate texts in chosen fields of knowledge which require integration of several pieces of information for generating meaning.	Compares and contrasts views on technology in newspaper articles. Interprets the purposes and objectives for the use of technology after the reading a brochure or manual. Selects technological practices to conform with the guidelines for health and safety, environmental impact and ethical practice, and uses them within those guidelines.
	4.2	Interprets texts, which include ambiguity, and inexplicitness where reader needs to distinguish fact from opinion and infer purpose. Interprets and extrapolates from texts containing data which includes some abstraction, symbolism, and technicality presented in graphic, diagrammatic, formatted or visual form.	Uses guidelines to ensure technological equipment is used to its full capacity. Uses a computer to prepare a typed report from a hand-drafted report. Compares and contrasts different technologies and their impact, eg argues the case for new practices when using new technologies, reports on the effects of installation of new machinery. Writes a report on the impact of a particular technology for a specific audience, eg management committees, tri-partite committees. Reads a complex diagram to identify components and procedures for dealing with a technical fault or breakdown.

\* *Indicators of Competency sub-level*

**Reading**

Scale	IoC	Indicators of Competence	Technical Communication
3	3.1 3.2 3.3	<p>3.1 Reads and interprets texts of some complexity, integrating (where relevant) a number of pieces of information in order to generate meaning.</p> <p>3.2 Displays awareness of purpose of text, including unstated meaning.</p> <p>3.3 Interprets and extrapolates from texts containing data which is unambiguously presented in graphic, diagrammatic, formatted or visual form.</p>	<p>Reads a technical manual where the information is supported by diagrams, sufficiently well to be able to locate and comprehend particular information required, eg programs a VCR to record two programs in advance.</p> <p>Uses the author, title, key word and other search indexes of a library computer.</p> <p>Comprehends short summary information on computer-managed learning packages to choose a relevant package to suit own needs.</p> <p>Uses the word processing program on a computer to produce texts.</p> <p>Writes simple instructions for using familiar technology, eg how to use an automatic teller machine.</p> <p>Completes a formatted workplace test, eg damage or breakdown report.</p> <p>Writes a brief report on uses of technology, eg for classroom, workplace, domestic or community purposes.</p>
2	2.1 2.2	<p>2.1 Reads and interprets short simple texts on a personally relevant topic.</p> <p>2.2 Locates specific information relating to familiar contexts in a text which may contain data in simple graphic, diagrammatic, formatted or visual form.</p>	<p>Reads short, relevant, explicit, clearly formatted texts related to technology, eg the author and title index of a library computer.</p> <p>Chooses a computer assisted learning package, having read short descriptions of one or two programs, to acquire a defined skill or area of knowledge.</p> <p>Writes a short description, eg describes a damaged part of a machine to facilitate repair.</p> <p>Extracts information from a list with language and numeracy components, eg price lists of components for computer systems.</p> <p>Records simple and routine information using the telephone, eg takes a phone message, on a form designed for this purpose.</p> <p>Interprets instructions, which combine pictorial and written information, eg directions on how to operate a piece of machinery safely.</p>
1	1.1 1.2	<p>1.1 Reads and identifies letters of the alphabet in the context of whole words, numbers, signs and symbols relating to personal details and immediate environment.</p> <p>1.2 Identifies specific information in a personally relevant text with familiar content, which may include personal details, location or calendar information in simple graphic, diagrammatic, formatted or visual form.</p>	<p>Recognises very short, explicit, pictorial texts, eg understands logos related to worker safety before using a piece of machinery, reads letters on a keyboard.</p> <p>Reads graphic instructions accompanying a new piece of technology to learn new information or skills about a technology or medium, eg uses an automatic teller machine by following instructions given graphically on the screen.</p> <p>Types own name or single words into a computer-assisted learning program.</p>

## Writing

Scale	IoC*	Indicators of Competence	Technical Communication
5	5.4 5.5	Demonstrates well-developed writing skills by selecting stylistic devices to express complex relationships between ideas and purposes.  Generates complex written texts with control over generic structure.	Defines the purpose and objectives for the use of a particular technology, eg writes a report, which includes a detailed analysis of technology as, applied in a particular workplace or environment.  Draws on prior knowledge of the application of technology in researching the capacity of a new system, eg writes a briefing and recommends purchase or use of a particular system.  Uses technological principles to reduce constraints presented by environmental or physical capacity, eg writes a report, which compares the effectiveness and efficiency of manual and computerised record management systems.  Prepares a written or oral report, which critically evaluates the content, structure, and purpose of technical texts including graphic, diagrammatic or numerical information.  Adapts task instructions to suit changes in technology, eg writes plain English instructions for the operation of a new machine based on the manufacturer's instructions.  Draws from a number of sources and uses computer skills to prepare a report, eg CV and job application letter.
4	4.4 4.5	Communicates complex relationships between ideas by matching style of writing to purpose and audience.  Generates written texts reflecting a range of genres and using appropriate structure and layout.	Compares and contrasts views on technology in newspaper articles.  Interprets the purposes and objectives for the use of technology after the reading a brochure or manual.  Selects technological practices to conform with the guidelines for health and safety, environmental impact and ethical practice, and uses them within those guidelines.  Uses guidelines to ensure technological equipment is used to its full capacity.  Uses a computer to prepare a typed report from a hand-drafted report.  Compares and contrasts different technologies and their impact, eg argues the case for new practices when using new technologies, reports on the effects of installation of new machinery.  Writes a report on the impact of a particular technology for a specific audience, eg management committees, tri-partite committees.  Reads a complex diagram to identify components and procedures for dealing with a technical fault or breakdown.

\* *Indicators of Competency sub-level*

## Writing

Scale	IoC	Indicators of Competence	Technical Communication
3	3.4  3.5	Communicates relationships between ideas through selecting and using grammatical structures and notations, which are appropriate to the purpose.  Produces and sequences paragraphs according to purpose of text.	Reads a technical manual where the information is supported by diagrams, sufficiently well to be able to locate and comprehend particular information required, eg programs a VCR to record two programs in advance.  Uses the author, title, key-word and other search indexes of a library computer.  Comprehends short summary information on computer-managed learning packages to choose a relevant package to suit own needs.  Uses the word processing program on a computer to produce texts.  Writes simple instructions for using familiar technology, eg how to use an automatic teller machine.  Completes a formatted workplace test, eg damage or breakdown report.  Writes a brief report on uses of technology, eg for classroom, workplace, domestic or community purposes.
2	2.3  2.4	Writes about a familiar topic using simple sentence structure and joining ideas through conjunctive links where appropriate.  Completes forms or writes notes using factual or personal information relating to familiar contexts.	Reads short, relevant, explicit, clearly formatted texts related to technology, eg the author and title index of a library computer.  Chooses a computer assisted learning package, having read short descriptions of one or two programs, to acquire a defined skill or area of knowledge.  Writes a short description, eg describes a damaged part of a machine to facilitate repair.  Extracts information from a list with language and numeracy components, eg price lists of components for computer systems.  Records simple and routine information using the telephone, eg takes a phone message, on a form designed for this purpose.  Interprets instructions, which combine pictorial and written information, eg directions on how to operate a piece of machinery safely.
1	1.3  1.4  1.5	Copies letters of the alphabet, numbers, and dates in order to convey personal details such as name, address, telephone number.  Writes basic personal details about self or others such as name, address, and signature.  Writes one or two phrases/simple sentences conveying an idea, message or opinion drawing from a modelled text.	Recognises very short, explicit, pictorial texts, eg understands logos related to worker safety before using a piece of machinery, reads letters on a keyboard.  Reads graphic instructions accompanying a new piece of technology to learn new information or skills about a technology or medium, eg uses an automatic teller machine by following instructions given graphically on the screen.  Types own name or single words into a computer-assisted learning program.

## Numeracy

Scale	IoC*	Indicators of Competence	Technical Communication
5	5.10 5.11 5.12	<p>Interprets, selects and investigates appropriate mathematical information and relationships highly embedded in an activity, item or text.</p> <p>Selects and applies a wide range of mathematical strategies flexibly to generate solutions to problems across a broad range of contexts.</p> <p>Uses a wide range of oral and written informal and formal language and representation including symbols, diagrams and charts to communicate mathematically.</p>	<p>Calculates distance, length and location using the trigonometry and geometry of triangles in relevant situations, eg locates grid reference on a map for a boat travelling on an given bearing with time and speed specified; uses dimensions provided on a scaled plan of a roof to find the pitch or slope of the roof. Calculates quantities of materials to tile the roof applying a 4% allowance for wastage.</p> <p>Plans and gathers information on a negotiated topic from a variety of sources including government, industry and media about relevant community or workplace issues. Organises information by grouping. Graphically represents and analyses information for a particular purpose. Presents, individually or in a team, a report expressing a viewpoint, which is substantiated by discussion of supporting statistical evidence.</p> <p>Interprets and applies metric quantities and numbers in scientific notation, eg calculates the amount of oil in litres spilled from a tanker if it covers a surface area of water of approximately 1200 hectares (<math>1.2 \times 10^7 \text{m}^2</math>) to a thickness of <math>6 \times 10^{-3} \text{mm}</math>.</p> <p>Uses financial formulae, eg simple and compound interest to calculate and contrast the interest incurred in borrowing money from financial institutions.</p>
4	4.10 4.11 4.12 4.13	<p>Selects and investigates appropriate mathematical information and relationships embedded in an activity, item or text.</p> <p>Selects and applies an expanding range of mathematical strategies flexibly to solve problems in a variety of contexts.</p> <p>Examines and questions the appropriateness, possible interpretations and implications of aspects of a mathematical activity.</p> <p>Uses a range of oral and written informal and formal language and representation including symbols, diagrams and charts to communicate mathematically.</p>	<p>Uses ratio and scale to interpret dimensions on a basic plan.</p> <p>Applies similarity and ratio to estimate and calculate lengths, eg finds height of a building, a tree.</p> <p>Compares quality and costs of using imported vs Australian tiles, discount vs brand name paints.</p> <p>Presents information in appropriate graphical format to show different interpretations and influences, eg analysis of government spending on education.</p> <p>Applies formulae and interprets results relevant to a familiar practical situation, measuring the dimensions needed and substituting them into the formula, adjusting units where necessary, eg length of edging for circular garden or pond, capacity of a water tank or bath.</p> <p>Uses area and perimeter to calculate a range of options, eg given a certain length of fencing, plan a range of options for paddock dimensions, which meet specific area requirements.</p> <p>Calculates and contrasts monthly income from average sales, given a variety of salary options involving retainers and commission rates.</p>

\* *Indicators of Competency sub-level*

**Numeracy**

Scale	IoC*	Indicators of Competence	Technical Communication
3	3.10 3.11 3.12 3.13	<p>3.10 Selects appropriate mathematical information embedded in a real life activity, item or text.</p> <p>3.11 Selects and applies a range of mathematical strategies to solve problems in contexts which are familiar and may be interrelated.</p> <p>3.12 Reflects on and questions reasonableness and appropriateness of the purpose, process and outcomes of a mathematical activity.</p> <p>3.13 Uses oral and written informal and formal language and representation including symbols and diagrams to communicate mathematically.</p>	<p>Uses a distance scale to find the shortest route between two locations on a map and considers road terrain conditions in deciding preferred route.</p> <p>Expresses and calculates with metric quantities, eg interprets and costs quantities of cheese given different forms such as 350g, 0.35kg.</p> <p>Measures common three-dimensional shapes, eg room, and represents the information on an appropriate diagram drawn to scale.</p> <p>Calculates with common, fractions and metric measurements, eg adjusts the quantities in a recipe by halving or doubling to obtain the required amount.</p> <p>Uses a variety of methods to analyse advertising by comparing savings on a number of different items, eg at 12% off, 15% off, 1/3 off, price reduced by \$10.</p> <p>Compares casual and permanent rates of pay over a given time span for work of the same nature.</p>
2	2.9 2.10 2.11 2.12	<p>2.9 Locates relevant mathematical information in a familiar real life activity text.</p> <p>2.10 Selects and uses straightforward mathematical actions in a familiar and predictable contexts.</p> <p>2.11 Uses estimation and prior experience to examine purpose and check reasonableness of the process and outcomes of a mathematical activity.</p> <p>2.12 Uses oral and written informal and formal language and representation using some symbols and diagrams to communicate mathematically.</p>	<p>Compares measurements taken with estimated lengths of familiar objects, eg estimates and measures storeroom dimensions.</p>
1	1.10 1.11 1.12 1.13	<p>1.10 Locates simple key mathematical information in a familiar real life activity text.</p> <p>1.11 Recognises and uses straightforward mathematical actions which relate to immediate contexts.</p> <p>1.12 Uses rough estimation and prior experience to identify purpose and check reasonableness of the process and outcomes of a mathematical activity.</p> <p>1.13 Uses everyday informal oral language and representation including familiar symbols and diagrams to communicate mathematically.</p>	<p>Estimates lengths of familiar objects using metric units, eg a person's height, height of doorway.</p>



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**UEE06**

**Volume 2 – Part 2.4  
Key Competencies**

**Volume 2 of 2**

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## **Volume 2 Part 2.4**

### **2.4.1 Key Competencies**

All Training Packages require the integration of Key Competencies either in each unit of competency or across a qualification, depending on industry needs and preferences.

The Key Competencies were first defined in 1992 in the project report, *Putting General Education to Work: The Key Competencies Report* (Mayer Committee 1992). The skills and knowledge they describe are essential for effective workplace participation and involve the sorts of capabilities commonly used by employers as selection criteria. They underpin the ability of employees to adapt to technological, organisational, societal and functional change.

The Key Competencies are generic, in that they apply to work in general, rather than to particular occupations or industries. They focus on the application of knowledge and skills in an integrated way in workplace situations.

A working example of how to use the key competencies in the ElectroComms and EnergyUtilities Industry has been developed by TAFE South Australia and has been included in this section for interested practitioners.

The seven Key Competencies are

#### **1 Collecting, analysing and organising information**

The capacity to locate information, sift and sort information in order to select what is required and present it in a useful way and evaluate both the information itself and the source and methods used to obtain it.

#### **2 Communicating ideas and information**

The capacity to communicate effectively with others using the range of spoken, written, graphic and other non-verbal means of expression.

#### **3 Planning and organising activities**

The capacity to plan and organise one's own work activities, including making good use of time and resources, sorting out priorities and monitoring one's own performance.

#### **4 Working with others and in teams**

The capacity to interact effectively with other people both on a one-to-one basis and in groups including understanding and responding to the needs of a client and working effectively as a member of a team to achieve a shared goal.

#### **5 Using mathematical ideas and techniques**

The capacity to use mathematical ideas such as number and space, and techniques such as estimation and approximation for practical purposes.

## **6 Solving problems**

The capacity to apply problem-solving strategies in purposeful ways, both in situations where the problem and the desired solution are clearly evident and in situations requiring critical thinking and a creative approach to achieve an outcome.

## **7 Using technology**

The capacity to apply technology combining the physical and sensory skills needed to operate equipment with the understanding of scientific and technological principles needed to explore and adapt systems.

### **2.4.2 Performance Levels**

#### **Performance Level 1**

Competence needed to undertake activities efficiently and with sufficient self-management to meet the explicit requirements of the activity and to make judgments about quality of outcome against established criteria.

#### **Performance Level 2**

Competence needed to manage activities requiring the selection, application and integration of a number of elements and to select from established criteria to judge quality of process and outcome.

#### **Performance Level 3**

Competence needed to evaluate and reshape processes, to establish and use principles in order to determine appropriate ways of approaching activities and to establish criteria for judging quality of process and outcome.

### **2.4.3 Working Example of Key Competencies**

A working model of key competencies has been developed by TAFE South Australia. It provides, free of charge, on-line resource materials and tools. The online website called 'LINKup Key Competencies' is designed for students, trainers, teachers, employers and anyone with a serious interest in practically assessing and nurturing the development of their own or others' Key Competencies. Part of the site is built to entertain and made suitable for general interest and simple exploration of Key Competencies or Generic Skills. The remainder of the site is very comprehensive and suited to people with a serious interest in practical implementation of Key Competencies assessment and development.

The innovative website offers a comprehensive, proven practical way to assess and improve Key Competencies. It is based on 13 years of action research and development, has achieved national and international acclaim, is used by students, trainers, teachers and employers.

It covers four key areas:

### **1. Discover**

This section provides an opportunity to just explore what Key Competencies are about.

### **2. Investigate**

This section provides numerous resources to inform about the LINKup assessment process called '*Validated Self Assessment*'. This process is designed to give formal recognition for Key Competencies AND to help people improve these important personal skills.

### **3. Try**

After 'Investigating' LINKup, individuals have a chance to try 'first-hand' a LINKup Key Competencies Assessment (via an online simulation) and to check their understanding of the 'Validated Self Assessment' process (via a short multiple-choice quiz). This also allows them to Register for free access to the complete package of LINKup resources.

### **4. Reflect**

This section provides individuals with an opportunity to reflect on how LINKup could help them. Also, for educators or trainers it offers some suggestions on different ways to implement LINKup in training programs and for employers there are some suggestions for incorporating this strategy into Performance Management for all staff.

### **Resources**

ALL LINKup resources are available FREE of charge upon successful registration. These can be accessed directly from the homepage via the 'resources' link.

Resources are listed in the following categories:

- **Online Resources**
  - Validated Self Assessment Sheets (including NEW interactive versions!)
  - Key Competencies Assessment (for Everyone)
  - Implementing Key Competencies Assessment (for Trainers)
  
- **Research Documents**
  - Key Competencies Assessment at Torrens Valley TAFE
  - Stories from the field
  
- **Complete Resource Pack**
  - Download ALL the LINKup resources in one convenient Pack

The website address is: <http://www.tvtafe.sa.edu.au/linkup/>



TRAINING STANDARDS  
AUSTRALIA

**ELECTROTECHNOLOGY  
TRAINING PACKAGE**

**UEE06**

**Volume 2 – Part 2.5  
Skills Enabling Employment**

**Volume 2 of 2**

## Electrotechnology Training Package UEE06 – Version Number 1. Review Date 31 Dec 2008

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## Volume 2 Part 2.5

### 2.5.1 Skills Enabling Employment

The Competency Standard Units incorporate a range of employment-based skills that are expected of individuals in a workplace. The skills for employment set out below should be achieved and confirmed consistent with Competency Standard Unit requirements and relative to the qualification to which the unit contributes. Assessment must be applied holistically and confirm that the critical aspects of evidence have been demonstrated to the required level.

Skill for employment	Critical aspect of evidence
1 Developing and using skills within a real workplace	Demonstrates an ability to develop and use spatial, dexterity and technology skills as well as health, safety and housekeeping skills meaningful to a workplace environment.
2 Learning to learn in the workplace	Demonstrates an ability to access, confirm and learn – can acquire knowledge and culture related to and used in a workplace environment.
3 Reflecting on the outcome and process of work task	Demonstrates an ability to reflect on performance of the work task, its outcome and the process(es) used in completing the task in a workplace environment.
4 Interacting and understanding of the context of the work task	Demonstrates an ability to interact in real work tasks, understand the context of the task within a work environment and speak and write to related personnel/communities to a standard expected in the workplace/industry sector.
5 Planning and organising the meaningful work task	Demonstrates an ability to prepare, organise and complete real work tasks to workplace standards, including selecting appropriate tools/equipment to complete tasks in a workplace environment, and setting and achieving personal goals.
6 Performing the work task in non-routine or contingent situations	Demonstrates an ability to seek and apply solutions to problems, using mathematical and cognitive skills relevant to a workplace environment, and/or seeking advice from appropriate personnel when in doubt.